HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project

SEMI-ANNUAL
ENVIRONMENTAL MONITORING REPORT

Reporting Period
July- December 2018

U.S. Nuclear Regulatory Commission License SUA-1471
State of New Mexico DP-200

TABLE OF CONTENTS

TABLES

TABLES (cont.)

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This Semi-Annual Environmental Monitoring Report summarizes effluent monitoring data recorded for Homestake Mining Company of California - Grants Project (Homestake) from July through December 2018. The submittal of this report to the appropriate Nuclear Regulatory Commission (NRC) Regional Office and State of New Mexico within 60 days after January 1, and July 1 for each year of operation is required for all uranium mill facilities pursuant to 10 CFR Part 40.65. The monitoring data and the report format have been selected by Homestake representatives to satisfy the requirements of 10 CFR Part 40.65 and Discharge Permit No. 200, dated September 18, 2014

Homestake's monitoring and surveillance program for radioactive effluent releases have been designed to ensure the project's compliance with 10 CFR Part 40, and Part 20 U.S. NRC Standards for Protection Against Radiation and closely approximates programs as described in NRC's Regulatory Guide 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills. Some effluent monitoring activities differ from those presented in the Regulatory Guide 4.14 as required by Homestake's Radioactive Materials License (SUA-1471).

Recontouring reclamation activities began in September 1993 and mill demolition commenced in late October 1993 and was completed December 10, 1995. A mill decommissioning completion report was submitted in February 1996 and approved by the NRC on January 28, 1999. The large tailings pile (LTP) has been re-contoured and covered with an interim cover on the top and radon barrier on the outslopes. Bedding and erosion protection was placed on the outslopes after placement of the radon barrier. Soil cleanup verification of the off-pile contaminated soil (windblown tailings) is complete; the completion report was submitted December 18, 1995 and approved by the NRC on January 29, 1999.

A summary of the operations of groundwater treatment technologies, as required by DP-200 is provided in Section 3.0.

Homestake's groundwater monitoring program, as outlined in license Condition No. 35, continued throughout the report period. The requirements set forth in Condition No. 35 include the reporting of both radiological and non-radiological water quality parameters for specified wells, as well as the documentation of water injection and collection volumes of the groundwater cleanup system. The performance review of the corrective action program is submitted annually as a separate document and contains the groundwater monitoring information for January 1 through December 31 of each year. In order to meet NRC's requirement for semi-annual reporting, groundwater-monitoring data for the point-of-compliance (POC) wells, pond monitoring wells DD, DD2 and X and background well P are included in this report. It should be noted that while the POC wells will eventually be used to demonstrate groundwater restoration, they are not currently representative of off-site groundwater quality conditions.

2.0 ENVIRONMENTAL MONITORING PROGRAMS

The monitoring requirements for the site are summarized in Table 2-1, Table 2-2, and Table 2-3 attached. Details of the monitoring program are discussed in the following sections:

2.1 Air Particulate Monitoring

Homestake continuously samples total suspended particulate at seven locations around the reclamation site (see Figure 1). Those locations identified as HMC-1, HMC-1A, HMC-2 and HMC-3 are areas at the property boundary expected to have the highest predictable concentrations of airborne radioactive particulate. The predominant wind direction is from the southwest; accordingly, HMC-1, HMC-2 and HMC-3 are generally located downwind from Homestake's reclamation activities. HMC-1A is northeast of EP-3 located north of the mill site. The location identified as HMC-6 represents background conditions for air particulates and is located due west of the large tailings pile at the western most side of the property boundary. Locations HMC-4 and HMC-5 are site proximal to the nearest residences. HMC-7 is a blank Whatman filter that is analyzed as a lab and filter manufacturer quality check sample.

Homestake uses Sierra Instruments Model #305-200 High Volume Air Samplers (or equivalent) to continuously sample the ambient air at the locations shown in Figure 1. The samples are collected on 8-inch by 10-inch Whatman glass fiber filters (or equivalent), which are changed weekly or more frequently as required by dust loading. Energy Laboratories, Inc. (ELI) analyzes the collected samples quarterly for Natural Uranium, Radium-226 and Thorium-230. Air sampling flow volumes and run times are recorded by HMC and the data are reported to ELI for calculation of average radionuclide concentrations in air particulates.

The results of environmental air particulate monitoring for 2nd half 2018 are provided in Attachment 1 and are summarized/evaluated in Attachment 4.

2.2 Radon Gas Monitoring

Radon-222 gas concentrations in ambient outdoor air are monitored on a continuous basis at the nine locations identified in Figure 1. The background location for radon gas is HMC #16, located northwest of the site. Rapidos high-sensitivity track-etch passive radon monitors (PRM) from Radonova (formerly Landauer Radon), or equivalent, are used to continuously monitor radon gas at each sampling location. Homestake personnel place new PRMs quarterly at the monitoring locations and the exposed detectors are retrieved and returned to the vendor for analysis. The PRM detectors measure radon gas concentrations in ambient outdoor air by exposing a special alpha-particle sensitive plastic chip mounted inside a chamber with a membrane filter on one end that is permeable to air and radon gas, but not to dust or solid phase particulate radionuclides. Radon-222 gas from ambient air diffuses through the membrane, and the subsequent decay of radon gas inside the chamber causes imprint tracks on the alpha-sensitive plastic chip that can be enhanced by a chemical etching process and counted after collection. The radon gas concentration is calculated by determining the number of tracks per unit area of the plastic chip. The semi-annual average results are presented in Attachment 2.

2.3 Effluent and Radon Flux Monitoring

Regulations in 10 CFR 40.65 require licensees to estimate and report the quantities of principal radionuclides released to unrestricted areas in gaseous effluents every six months.

Radon-222 was the only gaseous-phase effluent radionuclide released to unrestricted areas in 2018. The principal sources of radon-222 at the site are the large tailings pile (LTP) and Small Tailings Pile (STP). Radon-222 releases from components of the water treatment system (the Reverse Osmosis [RO] building and evaporation ponds) are insignificant relative to those of the LTP and STP.

Annual flux measurements for calendar year 2018 were made in two separate deployments, consisting of 100 canisters per deployment. The first 100 canister measurements were made on the top of the LTP on May 8-9, 2018. The second 100 canister measurements were made on the STP on May 15-16, 2018. These deployments were conducted in accordance with the methods proposed in HMC's response to the NRC's recent notice of violation (NOV) regarding an average radon flux rate from the LTP that exceeded the 20 pCi/m^2-s standard given in 10 CFR 40, Appendix A (ERG, 2017 and NRC, 2017). The Radon Flux report was provided in Attachment 3 of the 2018 1st half semi-annual report (HMC, 2018a). Average Rn-222 flux values of 51.3 and 12.7 picocuries per square meter per second ($pCi\ m^{-2}\ s^{-1}$) for the LTP and STP, respectively were measured in 2018 (HMC, 2018a, Attachment 3).

On April 20, 2017, the NRC issued a notice of violation for the manner in which average radon flux was measured and calculated for 2015 (The 2016 annual flux report, dated January 2017, observed previously existing protocols pending NRC resolution of a regulatory decision on these matters). On April 24-26, 2017 the NRC conducted an onsite inspection, and in associated discussions indicated that side slopes of the LTP, upon which final cover was completed in 1995 (including flux measurements followed by placement of final erosion control material), cannot be used for annual flux estimates unless new flux measurements on the side slopes are conducted. NRC indicated that 100 annual measurements across the top of the LTP, and calculation of the arithmetic mean of the 100 measurements, would be an acceptable approach to meet the requirements of License Condition 36(E) with respect to the LTP. This protocol was observed for the 2018 measurements as detailed in the Annual Radon Flux Report (HMC, 2018a, Attachment 3).

With respect to the STP, the evaporation pond (EP1) is an operational facility as EP1 operations and disposal of additional materials in the STP will continue. Since the STP is still operational, it can be broken into regions in accordance with EPA Method 115, with the pond being one region of zero flux (28.7 acres), and the remaining areas (earthen surfaces) representing a second region (26 acres). Section 2.1.7 of EPA Method 115 provides an explicit mathematical formula for area-weighted averaging of various regions to determine the overall weighted average flux for the entire pile. Under Method 115, calculation of effluent release of radon from the STP for 2017 was based on the flux measurement data noted above (100 flux measurements), and a calculated overall area-weighted average flux for the two regions as follows (excerpted from EPA Method 115):

(b) The mean radon flux for the total uranium mill tailings pile shall be calculated as follows.

$$J_s = \frac{J_1A_1 + J_2A_2 + \ldots + J_iA_i}{A_t}$$

where:

J_s = Mean flux for the total pile (pCi/m^2-s)
J_i = Mean flux measured in region i (pCi/m^2-s)
A_i = Area of region i (m^2)
A_t = Total area of the pile (m^2)

Based on the above information and 2018 flux monitoring results, the calculated average radon flux effluent value for the LTP in 2018 is 51.3 pCi/m^2-s as reported in the 2018 Annual Radon Flux Report (HMC, 2018a, Attachment 3). With respect to the STP, the arithmetic mean flux for the earthen region of the pile (105,272 m^2 area) was 12.7 pCi/m^2-sec. The area of EP1 is approximately 116,204 m^2, and this pond area was assigned a value of zero flux. The overall area-weighted average radon flux for the STP was calculated as follows:

STP Radon Flux = [(26.7 pCi/m^2-s)(105,272 m^2) + (0 pCi/m^2-s)(116,204 m^2)] / (221,148 m^2)
= 12.7 pCi/m^2-s

Based on the measured/calculated 2018 average flux values (51.3 and 12.7 pCi m^{-2} s^{-1} for the LTP and STP, respectively), along with the approximate areal extent of the applicable surfaces including the top of the LTP (≈ 106 acres) and the entire STP (≈ 54.7 acres), the radon emissions from the tailings piles in 2018 are calculated to be 694 Ci and 88.7 Ci respectively. For the second half semi-annual reporting period only, effluent radon releases are assumed equivalent to half of these values, or 347 Ci and 44.4 Ci for the LTP and STP respectively.

3.0 OPERATIONS

3.1 Flow Rates

The monthly influent totals to each of the evaporation ponds are presented in Table 3.1-1 for the second half of 2018. Inputs to Evaporation Pond 2 were RO brine, zeolite regeneration, tailings sumps, and transfers from the collection pond. Transfers from Evaporation Pond 2 to Evaporation Pond 1 and transfers from Evaporation Pond 1 to Evaporation Pond 3 are presented in this table as well. The influent into the collection ponds was from well 802, and miscellaneous flow from the RO plant which includes any diverted flow, flow from the RO sumps, backwash from the microfiltration system, blow down from the clarifiers and zeolite regeneration. The freeboard measurements taken from the evaporation and collection ponds are tabulated in Table 3.1-2. The readings on the West Collection Pond are taken as either overflowing (O/F) into the East Collection Pond via a spillway or not overflowing (Not O/F). The leak detection volumes pumped from Evaporation Ponds 2 and 3 are presented in Tables 3.1-3 through 3.1-5. These three tables give the gallons per day per acre (GPD/AC) with values

that exceed 775 GPD/AC highlighted in blue. Pumps in these cells or adjacent cells were adequate to keep up with these rates.

The tailings sump volume, collection and injection totals for the Large Tailings Pile are presented in Table 3.1-6. Injection into the LTP ceased in July 2015. The monthly collection totals broken out by aquifer and restoration area are shown in Table 3.1-7. The monthly injection totals broken out by aquifer and area are presented in Table 3.1-8. The On-Site, South Off-Site, and North Off-site injection water is a combination of San Andres water, zeolite treated water, and RO Product water. The monthly totals for the low concentration and in-situ injectate are presented in Table 3.1-9, which were not operated in the second half of 2018. The low concentration re-injection ceased operation in July of 2016.

Table 3.1-10 presents the influent totals for the active treatment systems. The inflow to the RO plant averaged 540 gpm in the second half of 2018 while the inputs to the 300 zeolite and 1200 zeolite cells were 6.4 and 277 gpm, respectively. Table 3.1-11 presents the total volumes of treated effluent. It also presents the regeneration and brine effluents that were discharged into Evaporation Pond 2 from the treatment systems. The fresh water injection totals from each of the three restoration areas are also presented in this table.

3.2 Reversal Wells

The depth to water measurements for the Reversal Wells are presented in Table 3.2-1. Water levels in alluvial well S5 have been used in place of well S1 for the S1-S2 reversal pair due to the effects of the nearby S injection line on water levels in well S1. Because the operation of the S injection line results in water level changes in both S1 and S2, it is necessary to monitor water levels in well S5 which is closer to the collection area in order to effectively monitor gradient reversal.

3.3 Pond and Pipeline Maintenance

During this semi-annual reporting period, no liner repair work was performed. The following significant pond and pipeline maintenance activities were performed:

- Ability to transfer water between Evaporation Ponds 2 and 3 was completed in September 2018 by installing a new line from EP2 to the existing line from EP1 to EP3.

No discharges from impacted water conveyance pipelines to non-authorized areas occurred during this time period. Onsite incidental leaks and spills resulting from equipment failure and/or weather-related are summarized in the leak register maintained at the site.

3.4 Well Drilling and Closures

No new wells were drilled on-site during the period from July through December of 2018 as indicated in Table 3.4-1. In addition, former San Andres well #943 and Old #1 were plugged and abandoned in the second half of 2018.

3.5 Facilities Inspections and Maintenance

Facilities, structures, contaminated fluid pipelines, equipment, diversion structures and diversion channels associated with groundwater treatment, and drainages were inspected during the period from July through December of 2018. Minor surface water erosion piping was identified originating on top of the LTP and down the southern slope after several rain events. The erosional subsurface piping channel was backfilled to prevent further erosion in this area.

In addition, the following significant maintenance activities were performed during this semi-annual reporting period on the groundwater treatment systems:

Zeolite Groundwater Treatment

- In September 2018, piping repair for the 300 zeolite treatment system occurred and new double-walled regeneration acid tanks were installed on both the 1200 zeolite and 300 zeolite systems; and
- In October and November 2018, effluent piping was updated for the 1200 zeolite treatment system to allow separate operation of each train.

Reverse Osmosis Groundwater Treatment

- In August 2018, membrane replacement of RO3 occurred;
- In September 2018, micro-filtration module replacement (80 modules) occurred and a polymer injection system was installed; and
- In October, November, and December 2018, calcium scaling removal from the flash mix tank, clarifier weirs and troughs, flash mix tank, lime plant slaker and slurry tanks, and lime plant sump occurred.

4.0 WATER QUALITY MONITORING

4.1 Groundwater Quality Monitoring

Table 2-2 outlines the water quality sampling frequency and parameters monitored. In addition, the volumes of water injected and recovered as part of the ground-water cleanup program are monitored on a weekly frequency and the rates documented. A performance review report is submitted by March 31 of each year according to License Condition 35E. The groundwater monitoring data for the POC wells, as required to comply with 10 CFR 40.65, are reported in Tables 4.1-1 through 4.1-6 Samples from background well P were not collected in the second half of 2018 because they were collected in the first half of the year (see Table 4.1-4). The water quality of the Point of Compliance (POC) wells is currently being restored; therefore, the reported levels are not representative of steady state aquifer conditions at the present time and the concentration levels are not compared to 10 CFR 20 effluent limits. A hydraulic barrier forces the water in the aquifer near these POC wells to move in the direction of the collection wells where the water is withdrawn and treated. Due to these conditions, water level data on these wells are also not reflective of steady state conditions, and therefore are not reported here.

4.2 Pond Water Quality Monitoring

Table 4.2-1 presents the water quality data associated with the collection and evaporation ponds. The water quality data for the Evaporation Pond alluvial monitoring wells are presented in Table 4.2-2. This table highlights the concentrations that exceed the alluvial site standards in blue. The sulfate concentrations naturally exceed the site standard in wells DD and DD2. The TDS in well DD also exceeds the site standard. The uranium concentrations in well DD2 naturally exceed the alluvial site standard as they have since this well was drilled. Total concentrations for manganese, selenium, molybdenum and uranium are presented for the ponds and are generally similar to the dissolved concentrations. Table 4 from the Discharge Permit DP-200 requests uranium activity as one of the analytes for monitoring but is not included because it is a calculated value from the uranium concentrations.

4.3 Treated Water Quality Monitoring

Table 4.3-1 presents the effluent water quality analysis from the Post Treatment Tank (SP2). The SP2 sample is collected after mixing of the RO product, zeolite treated and fresh water. This table also shows that all SP2 concentrations in the second half of 2018 were less than all of the alluvial site standards for each of these samples. The laboratory minimum detection concentration with a less than sign was used for the radium and thorium values when not detected at the minimum detectable concentration.

Table 4.3-2 presents the treated water quality data for the RO product (SP1) and the zeolite treated water (300Z, 1200Z Trains 1 & 2, and 1200Z Trains 3 & 4) with sample constituent concentrations that exceed the alluvial site standards highlighted in blue. All RO product constituent concentrations measured in the second half of 2018 were less than or equal to the corresponding alluvial site standards with the exception of one molybdenum value. The molybdenum concentration for the SP1 on 9/28/18 exceeded the standard but did not result in an exceedance in the SP2 sample after the RO product water was mixed with zeolite treated and fresh water. An investigation of this SP1 exceedance indicated a problem with the membrane on RO that was not treating properly and was corrected. Table 4.3-2 also presents the treated water quality for the zeolite treatment process. In the second half of 2018, zeolite was used to treat Off-site water for uranium in the 300 zeolite system and four trains in the 1200 zeolite systems. The zeolite treated water is monitored for the discharge from the 300 zeolite and Trains 1 & 2 and Trains 3 & 4 from the 1200 systems. Only one molybdenum concentration on 9/13/18 exceeded the site standard in the second half of 2018 300Z zeolite samples. The SP2 sample for molybdenum in September was approximately ten percent of the site standard showing that the 300Z treated water, when mixed with the RO and 1200Z treated waters and the fresh water, did not result in a significant molybdenum concentration in the injection water.

5.0 DIRECT RADIATION

Gamma dose rates are continuously monitored using optically stimulated luminescence (OSL) dosimeter badges placed at each of the eight locations identified in Figure-1. HMC #16 is considered the background location for direct radiation. Each OSL badge consists of an aluminum oxide detector within a plastic holder. The plastic provides adequate protection from

weather for these badges to be used outdoors. The OSLs are exchanged semi-annually and analyzed by an approved independent laboratory (currently Landauer). The levels of direct environmental radiation are recorded for each of the eight locations. Pertinent sample data are reported in Attachment 3.

6.0 SURFACE CONTAMINATION

The Occupational Monitoring Program requirements are summarized in Table 2-3. The aspects related to contamination control are discussed briefly below.

6.1 Personnel Skin and Clothing

The monitoring of personnel for alpha contamination may be required by the RSO depending on the nature of the work being performed as specified in the Radiation Protection Program (RPP) Manual (HMC, 2018b). The applicable procedure is found in SOP 12 (Contamination Surveys) which may or may not be conducted under a radiation work permit (RWP). Documentation for personnel contamination surveys is maintained in each specific RWP documentation binder or in a binder for miscellaneous surveys as applicable. For the second half of 2018, no personnel or clothing above administrative limits (distinguishable from background) were released from the Site.

6.2 Survey of Equipment Prior to Release for Unrestricted Use

Equipment surveys are required for all equipment that is to be removed from Restricted Areas as specified in the RPP (HMC, 2018b). Standard Operating Procedures are used for these surveys. No releases of contaminated material above NRC release criteria were reported during this reporting period.

7.0 LOWER LIMIT OF DETECTION

Homestake representatives have calculated the Lower Limit of Detection (LLD) for each measurement system, where applicable; to more accurately evaluate concentrations of radioactive material measured in the environment surrounding the mill site. The lower limit of detection is defined in U.S. Nuclear Regulatory Guide 8.30 – Appendix B as the smallest concentration of radioactive material that has a 95% probability of being detected. Radioactive material is "detected" if the value measured on an instrument is high enough to conclude that activity above the system background is probably present. Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc., it varies for different sampling and analysis procedures.

For the individual measurement systems for which Homestake calculates LLDs, the following formula is utilized:

$$LLD = \frac{3+4.66\ S_b}{3.7\ E\ 4\ EvY \exp(-\lambda t)}$$

Where:

LLD	is the lower limit of detection (microcuries per milliliter [μCi/ml]);
S_b	is the standard deviation of the instrument background counting rate (counts per second);
3.7 E 4	is the number of disintegrations per second per microcurie;
E	is the counting efficiency (counts per disintegration);
v	is the sample volume (ml);
Y	is the fractional radiochemical yield (when applicable);
λ	is the radioactive decay constant for the particular radionuclide; and;
t	is the elapsed time between sample collection and counting

The value of S_b used in the calculation of the LLD for a particular measurement system will be based on the actual observed variance of the instrument background counting rate. The laboratory has been instructed to report the LLD for each measurement considering all of the parameters associated with the measurement system and the sample size.

The vendor laboratory that performed the analyses reported herein has documented that the LLD for air and water samples will meet or exceed the requirements in Regulatory Guide 4.14. This assumes a minimum water sample size of 1 liter and an air sample volume of 2 E 9 ml. Landauer (vendor lab) reports the LLD for radon-222. The LLDs for the constituents are:

Ra-226, Th-230 in air	1 E-16 μCi/ml
Rn-222 in air	30 pCi(d/l)
U-nat in air	1 E-16 μCi/ml
U-rad in water	2 E-10 μCi/ml
Ra-226, Th-230 in water	2 E-10 μCi/ml

Uranium is analyzed by ICP-MS methods by the current vendor laboratory. In order to determine the LLD, the laboratory has performed the analysis on a blank sample many times and uses the standard deviation of these background measurements to calculate the LLD. This LLD is specified for all analyses as long as the sample size or volume meets the minimum value.

8.0 DATA SUMMARY AND CONCLUSIONS

The summaries of Homestake's effluent monitoring program included in this submittal contain data for each of the regulated parameters released to unrestricted areas. DP-200 and 10 CFR Part 40.65 requires that Homestake submit effluent release monitoring data to the State of New Mexico and the NRC within 60 days of the end of the six-month period ending January 1 and July 1 of each year. Homestake is submitting this report to satisfy the regulatory requirements cited above. The

attachments included in this report summarize the results of the effluent monitoring activities conducted by Homestake and pertinent to the required monitoring time period.

The data collected in many of Homestake's effluent monitoring programs can be readily compared to 10 CFR Part 20 values, not for determinations of public dose, but as a qualitative benchmark indicator for identifying effluent levels or trends that could pose a concern in terms of compliance with public dose limits given in 10 CFR 20.1301. During the report period, Homestake has not exceeded 10 CFR Part 20 values in any terrestrial effluents covered by this report. This, of course, does not include the ground water values at the POC wells as discussed earlier.

REFERENCES

Environmental Restoration Group, Inc. (ERG). 2017. Proposal to address radon flux NOV for the LTP (NRC Docket No. 040-08903/2016-001 License No. SUA-1471). In: Reply to Notice of Violation, Docket No. 040-08903/2016-001, License No. SUA-1471 [Submitted to NRC by Homestake Mining Company of California (HMC) on September 13, 2017].

Homestake Mining Company of California (HMC). 2018a. Semi-Annual Environmental Monitoring Report. Reporting Period January-June 2018. Homestake Grants Reclamation Project, Cibola County, New Mexico. August.

Homestake Mining Company of California (HMC). 2018b. Radiation Protection Program Manual, Revision 2. Homestake Grants Reclamation Project, Cibola County, New Mexico. October 26.

U.S. Nuclear Regulatory Commission (NRC). 2017. NRC Inspection Report 040-08903/2016-001 and Notice of Violation. April 20, 2017.

Table 2-1
Environmental Monitoring Program Excluding Groundwater Monitoring

Table 2-1 - Environmental Monitoring Program Excluding Groundwater Monitoring

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
AIR Particulates	4	HMC-1, HMC-1A, HMC-2, HMC-3 at or near the site boundary in sectors that have the highest predicted concentrations of radioactive airborne particulates.	Continuous (High Vol.)	Weekly filter change or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230 Vanadium
	2	HMC-4, HMC-5 at site boundary nearest occupied residences	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230 Vanadium
	1	HMC-6 background location	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230 Vanadium
Radon Gas	9	Locations described in Air - Particulates & HMC-7 on S boundary, HMC-1A near Evaporation Pond (EP-3), & HMC-16 as a background	Continuous Track-etch	Quarterly	Rn-222
DIRECT RADIATION	8	Locations described in Air - Particulates & HMC-16 as a background	OSL	Semi-Annual	Gamma Exposure Rate

Table 2-2
Groundwater Monitoring Program (8-99, as modified by Amendment 34)

Table 2-2 Groundwater Monitoring Program (8-99 as modified by Amendment 34)

Well Number	Parameters to be Monitored	Frequency of Monitoring
#1 & #2 Deep wells	D	Annually
Broadview Acres Wells 446, SUB1, SUB2, SUB3	G	Annually
Felice Acres Wells 490, 492, 493, 494	G	Annually
Murray Acres Wells 802, 844	G	Annually
Pleasant Valley Wells 688, 846	G	Annually
Regional Wells 920, 942	G	Annually
Site Monitoring Wells F, FB, GH, MO, CW2	G	Annually
Collection System Wells	Total Volume	Monthly
Injection System Wells	Total Volume	Monthly
Reversal Wells B, BA, KZ, DZ, SO, SP, S1, S2	Water Level	Weekly
Point of Compliance Wells D1, X, S4	B, F	Annually
Background Well P	B	Annually

B = Water Level, pH, TDS, SO_4, Cl, HCO_3, CO_3, Na, Ca, Mg, K, NO_3, U, Se, Mo, Ra-226
D = Ca, Mg, K, Na, HCO_3, CO_3, Cl, SO_4, pH, TDS, Al, As, Ba, Cd, Co, Cu, CN, F, Fe, Pb, Mn, Hg, Mo, Ni, NO_3 as N, Se, Ag, Zn, U, Filtered Ra-226
F = V, Ra-228, Th-230
G = Water Level, SO_4, U, Se, TDS, Mo

Table 2-3
Occupational Monitoring Program (6-00)

Table 2-3 Occupational Monitoring Program (6-00)

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
Lapel Personal Air Sample	As required by RWP	As required by RWP (2 L/min or equivalent)	HP-1	As required by RWP	Alpha, U-Nat
Lapel Personal Air Sampler Calibration	As required by RWP	N/A	HP-1	As required by RWP	Flow rate
Release of Equipment	As required by RWP	Potentially Contaminated Equipment and Materials	HP-4	As required by RWP	Alpha, beta gamma
ALARA	N/A	As required by RPA	HP-6	N/A	As required by RPA
Respiratory Protection	As required by RWP	As required by RWP	HP-7	N/A	N/A
Bioassay	As required by RWP	As required by RWP	HP-8 after mill decommissioning; termination	Baseline, Semi-annual	U-Nat in urine
Instrument Calibration	Variable	Radiation Detection Instruments in use	HP-10	Annually	N/A
Personnel Gamma (OSL)	Variable	Personnel	HP-11	Quarterly	Gamma
Personnel Contamination	As required by RWP	As required by RWP	HP-12	As required by RWP	Alpha
Radiation Protection Training	As required	Mill Site taught by RPA (certified individual) subjects as per Reg Guide 8.31	HP-14 for people working with groundwater or physical work with tailings sand/ slimes	Initial & annual refresher	Training Class & Written Test

HP-# = Homestake procedure number; RPA = Radiation Protection Administrator;
RWP = Radiation Work Permit; OSL = Optically Stimulated Luminescence dosimeter

Tables 3.1-1 through 3.1-11
Flow Rates

Table 3.1-1. Evaporation and Collection Pond Monthly Influent Totals

Evap Pond 1

July	Interval Gallons
Transfer EP-2 to EP-1	0

August	Interval Gallons
Transfer EP-2 to EP-1	11,146,000

September	Interval Gallons
Transfer EP-2 to EP-1	11,653,000

October	Interval Gallons
Transfer EP-2 to EP-1	0

November	Interval Gallons
Transfer EP-2 to EP-1	0

December	Interval Gallons
Transfer EP-2 to EP-1	21,751,000

Evap Pond 2

July	Interval Gallons
R.O. Flow to Evaporation Ponds	5,010,860
Tailings Sumps	429,340
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	1,480,008
August	**Interval Gallons**
R.O. Flow to Evaporation Ponds	4,245,027
Tailings Sumps	336,070
Tailings Pile	0
Zeolite Regeneration & Overflow	1,858,420
E Coll Pond to EP-2	2,106,992
September	**Interval Gallons**
R.O. Flow to Evaporation Ponds	3,964,438
Tailings Sumps	361,410
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	2,277,592
October	**Interval Gallons**
R.O. Flow to Evaporation Ponds	4,387,325
Tailings Sumps	450,440
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	4,428,160
November	**Interval Gallons**
R.O. Flow to Evaporation Ponds	3,422,016
Tailings Sumps	290,550
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	1,387,960
December	**Interval Gallons**
R.O. Flow to Evaporation Ponds	2,966,667
Tailings Sumps	309,430
Tailings Pile	0
Zeolite Regeneration & Overflow	485,500
E Coll Pond to EP-2	1,538,768

Evap Pond 3

July	Interval Gallons
Transfer EP-1 to EP-3	12,400

August	Interval Gallons
Transfer EP-1 to EP-3	21,388,000

September	Interval Gallons
Transfer EP-1 to EP-3	23,636,600

October	Interval Gallons
Transfer EP-1 to EP-3	918,100

November	Interval Gallons
Transfer EP-1 to EP-3	0

December	Interval Gallons
Transfer EP-1 to EP-3	0

Collection Ponds

July	Interval Gallons
Miscellanous RO and Clarifier Flow	2,188,462
Tailings Sumps	0
Zeolite Regeneration	2,863,200
802	141,340

August	Interval Gallons
Miscellanous RO and Clarifier Flow	2,522,552
Tailings Sumps	0
Zeolite Regeneration	
802	128,560

September	Interval Gallons
Miscellanous RO and Clarifier Flow	3,248,723
Tailings Sumps	0
Zeolite Regeneration	
802	126,360

October	Interval Gallons
Miscellanous RO and Clarifier Flow	6,058,056
Tailings Sumps	0
Zeolite Regeneration	
802	153,740

November	Interval Gallons
Miscellanous RO and Clarifier Flow	3,820,502
Tailings Sumps	0
Zeolite Regeneration	
802	107,620

December	Interval Gallons
Miscellanous RO and Clarifier Flow	2,526,336
Tailings Sumps	0
Zeolite Regeneration	3,700
802	74,860

Table 3.1-2. Evaporation and Collection Pond Weekly Freeboard Measurements (feet)

	EP1	EP2	EP3A	EP3B	W Coll	E Coll
7/2/2018	3.6	6.35	7.3	7.3	O/F	3.62
7/9/2018	4	6.19	7.64	7.32	O/F	3.51
7/16/2018	4.05	5.88	7.86	7.36	O/F	2.86
7/23/2018	4.05	5.38	8.65	7.56	O/F	3.24
7/30/2018	4.15	5.12	7.83	7.48	O/F	3.61
8/6/2018	4.5	4.85	-	-	O/F	3.1
8/13/2018	4.5	4.71	7.46	7.34	O/F	3.51
8/20/2018	5.8	4.94	7.68	7.62	O/F	3.55
8/27/2018	7.2	6.2	3.8	6.35	O/F	3.2
9/3/2018	7.9	7.95	4.45	4.3	O/F	3.1
9/10/2018	8	6.75	7.7	6.9	O/F	3.4
9/17/2018	8	7.6	6.65	6.5	O/F	1.72
9/24/2018	8	7.6	6.36	6.1	O/F	1.4
10/1/2018	8	7.2	5.95	5.6	O/F	1.92
10/8/2018	8	7.01	5.55	5.3	O/F	2.12
10/15/2018	8	6.75	5.55	5.35	O/F	1.79
10/22/2018	8	6.49	5.4	5.4	O/F	1.58
10/29/2018	8	6.07	5.5	5	O/F	1.3
11/5/2018	8	5.99	5.3	5.1	O/F	1.4
11/12/2018	9	5.6	4.9	4.95	O/F	1.85
11/19/2018	10.8	5.25	3.49	3.29	O/F	1.43
11/26/2018	10.8	4.98	3.3	3.25	O/F	2.49
12/3/2018	10.4	6.21	3.46	4.44	O/F	2.91
12/10/2018	6.5	8.62	4.4	4.4	O/F	1.38
12/17/2018	8	8.2	4.44	4.41	O/F	0.9
12/24/2018	6.5	7.3	3.35	3.4	O/F	3.2
12/31/2018	6.3	7.01	3.3	3.4	O/F	2.8

Note: O/F = Overflowing to East Collection.
Not O/F = Not Overflowing to East Collection.

Table 3.1-3. Evaporation Pond 2 Leak Detection

Date	No. 1			No. 2			No. 3			No. 4			No. 5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	#			1,102,200			364,100			1,059,410			351,380		
7/2/2018	#	0	0	1,102,200	0	0	364,100	0	0	1,059,410	0	0	351,380	0	0
7/9/2018	#	0	0	1,102,200	0	0	364,100	0	0	1,059,410	0	0	351,380	0	0
7/16/2018	#	0	0	1,102,200	0	0	364,100	0	0	1,059,410	0	0	351,380	0	0
7/23/2018	#	0	0	1,102,200	0	0	364,240	140	5	1,059,410	0	0	351,380	0	0
7/30/2018	#	0	0	1,102,200	0	0	364,810	570	21	1,059,410	0	0	351,380	0	0
8/6/2018	#	0	0	1,104,350	2,150	98	365,240	430	16	1,059,410	0	0	351,380	0	0
8/13/2018	#	0	0	1,133,020	28,670	1,300	365,240	0	0	1,059,410	0	0	351,380	0	0
8/20/2018	#	0	0	1,178,300	45,280	2,054	376,530	11,290	422	1,059,410	0	0	351,380	0	0
8/27/2018	#	0	0	1,207,130	28,830	1,307	389,250	12,720	476	1,059,410	0	0	351,380	0	0
9/3/2018	#	0	0	1,207,130	0	0	389,250	0	0	1,059,410	0	0	351,380	0	0
9/10/2018	#	0	0	1,207,130	0	0	390,160	910	34	1,059,410	0	0	351,380	0	0
9/17/2018	#	0	0	1,210,900	3,770	171	390,510	350	13	1,059,410	0	0	351,380	0	0
9/24/2018	#	0	0	1,217,400	6,500	295	390,510	0	0	1,059,410	0	0	#	0	0
10/1/2018	#	0	0	1,217,420	20	1	390,510	0	0	1,059,410	0	0	#	0	0
10/8/2018	#	0	0	1,217,430	10	0	390,510	0	0	1,059,410	0	0	#	0	0
10/15/2018	#	0	0	1,217,440	10	0	390,510	0	0	1,059,410	0	0	#	0	0
10/22/2018	#	0	0	1,217,440	0	0	390,510	0	0	1,059,410	0	0	#	0	0
10/29/2018	#	0	0	1,242,640	25,200	1,143	390,520	10	0	1,059,410	0	0	#	0	0
11/5/2018	#	0	0	1,259,140	16,500	748	390,520	0	0	1,059,410	0	0	#	0	0
11/12/2018	#	0	0	1,264,450	5,310	241	390,520	0	0	1,059,410	0	0	#	0	0
11/19/2018	#	0	0	1,264,460	10	0	390,520	0	0	1,059,410	0	0	#	0	0
11/26/2018	#	0	0	1,277,870	13,410	608	390,520	0	0	1,059,410	0	0	#	0	0
12/3/2018	#	0	0	1,305,710	27,840	1,263	392,080	1,560	58	1,059,410	0	0	#	0	0
12/10/2018	#	0	0	1,318,050	12,340	560	392,160	80	3	1,059,410	0	0	#	0	0
12/17/2018	#	0	0	1,326,590	8,540	387	392,160	0	0	1,059,410	0	0	#	0	0
12/24/2018	#	0	0	1,335,360	8,770	398	392,180	20	1	1,059,410	0	0	#	0	0
12/31/2018	#	0	0	1,341,450	6,090	276	392,180	0	0	1,059,410	0	0	#	0	0

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance.
GPD/AC = Gallons per day per acre; those that exceed 775 are in bold.
 # = Pump not installed due to collapsed standpipe

Table 3.1-4. Evaporation Pond 3A Leak Detection

Cell A Sumps	A-1			A-2			A-3			A-4			A-5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	@			229,250			@			@			336,400		
7/2/2018	@	0	0	229,260	10	1	@	0	0	@	0	0	336,400	0	0
7/9/2018	@	0	0	229,260	0	0	@	0	0	@	0	0	336,400	0	0
7/16/2018	@	0	0	229,260	0	0	@	0	0	@	0	0	336,400	0	0
7/23/2018	@	0	0	229,260	0	0	@	0	0	@	0	0	336,400	0	0
7/30/2018	@	0	0	229,260	0	0	@	0	0	@	0	0	336,400	0	0
8/6/2018	@	0	0	229,260	0	0	@	0	0	@	0	0	336,400	0	0
8/13/2018	@	0	0	229,270	10	1	@	0	0	@	0	0	336,400	0	0
8/20/2018	@	0	0	229,270	0	0	@	0	0	@	0	0	336,400	0	0
8/27/2018	@	0	0	234,150	4,880	270	@	0	0	@	0	0	336,400	0	0
9/3/2018	@	0	0	267,360	33,210	1,839	@	0	0	@	0	0	336,400	0	0
9/10/2018	@	0	0	304,200	36,840	2,040	@	0	0	@	0	0	361,680	25,280	1,400
9/17/2018	@	0	0	338,670	34,470	1,909	@	0	0	@	0	0	383,480	21,800	1,207
9/24/2018	@	0	0	348,200	9,530	528	@	0	0	@	0	0	389,020	5,540	307
10/1/2018	70	0	0	385,750	37,550	2,079	303,160	0	0	29,990	0	0	405,620	16,600	919
10/8/2018	70	0	0	410,010	24,260	1,343	303,160	0	0	29,990	0	0	424,010	18,390	1,018
10/15/2018	70	0	0	443,160	33,150	1,836	303,160	0	0	29,990	0	0	432,620	8,610	477
10/22/2018	70	0	0	475,810	32,650	1,808	303,160	0	0	29,990	0	0	439,150	6,530	362
10/29/2018	70	0	0	514,970	39,160	2,168	303,160	0	0	29,990	0	0	439,620	470	26
11/5/2018	70	0	0	549,530	34,560	1,914	303,160	0	0	29,990	0	0	440,790	1,170	65
11/12/2018	70	0	0	571,970	22,440	1,243	303,160	0	0	29,990	0	0	441,560	770	43
11/19/2018	70	0	0	595,570	23,600	1,307	303,160	0	0	29,990	0	0	441,730	170	9
11/26/2018	70	0	0	635,500	39,930	2,211	303,160	0	0	29,990	0	0	441,730	0	0
12/3/2018	70	0	0	661,860	26,360	1,460	303,160	0	0	29,990	0	0	441,730	0	0
12/10/2018	70	0	0	682,000	20,140	1,115	303,160	0	0	29,990	0	0	441,730	0	0
12/17/2018	70	0	0	706,870	24,870	1,377	303,160	0	0	29,990	0	0	443,010	1,280	71
12/24/2018	70	0	0	722,280	15,410	853	303,160	0	0	29,990	0	0	446,220	3,210	178
12/31/2018	70	0	0	734,340	12,060	668	303,160	0	0	29,990	0	0	446,250	30	2

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance
GPD/AC = Gallons per day per acre; those that exceed 775 are in bold.
@ = Totalizer not connected

Table 3.1-5. Evaporation Pond 3B Leak Detection

Cell B Sumps	B-1			B-2			B-3			B-4			B-5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	52,980			508,620			1,415,030			286,480			447,800		
7/2/2018	52,980	0	0	508,620	0	0	1,415,020	-10	-1	286,990	510	28	443,810	-3,990	-221
7/9/2018	52,980	0	0	508,620	0	0	1,415,030	10	1	288,130	1,140	63	443,800	-10	-1
7/16/2018	53,100	120	7	508,620	0	0	1,415,020	-10	-1	288,780	650	36	443,800	0	0
7/23/2018	53,470	370	20	508,620	0	0	1,415,020	0	0	289,650	870	48	443,800	0	0
7/30/2018	53,630	160	9	508,620	0	0	1,415,030	10	1	290,430	780	43	443,810	10	1
8/6/2018	54,620	990	55	508,620	0	0	1,415,030	0	0	291,420	990	55	443,810	0	0
8/13/2018	54,620	0	0	508,620	0	0	1,415,030	0	0	291,920	500	28	443,800	-10	-1
8/20/2018	54,630	10	1	508,620	0	0	1,415,030	0	0	291,930	10	1	443,810	10	1
8/27/2018	56,100	1,470	81	508,620	0	0	1,418,310	3,280	182	292,610	680	38	443,810	0	0
9/3/2018	56,100	0	0	508,620	0	0	1,418,310	0	0	292,610	0	0	443,810	0	0
9/10/2018	57,050	950	53	508,620	0	0	1,421,730	3,420	189	293,110	500	28	443,820	10	1
9/17/2018	57,140	90	5	508,620	0	0	1,424,300	2,570	142	293,240	130	7	443,830	10	1
9/24/2018	57,160	20	1	508,620	0	0	1,424,300	0	0	294,200	960	53	443,830	0	0
10/1/2018	57,190	30	2	508,620	0	0	1,424,720	420	23	294,820	620	34	443,840	10	1
10/8/2018	57,200	10	1	508,620	0	0	1,429,300	4,580	254	295,380	560	31	443,840	0	0
10/15/2018	57,200	0	0	508,620	0	0	1,433,340	4,040	224	295,390	10	1	443,840	0	0
10/22/2018	57,220	20	1	508,620	0	0	1,437,210	3,870	214	295,400	10	1	443,840	0	0
10/29/2018	57,290	70	4	508,620	0	0	1,437,330	120	7	295,400	0	0	443,840	0	0
11/5/2018	57,300	10	1	508,620	0	0	1,446,550	9,220	511	302,880	7,480	414	443,840	0	0
11/12/2018	57,380	80	4	508,630	10	1	1,467,340	20,790	1,151	309,320	6,440	357	443,840	0	0
11/19/2018	57,400	20	1	508,630	0	0	1,485,470	18,130	1,004	309,330	10	1	443,840	0	0
11/26/2018	57,400	0	0	508,630	0	0	1,501,720	16,250	900	309,330	0	0	443,840	0	0
12/3/2018	57,400	0	0	508,630	0	0	1,516,470	14,750	817	309,330	0	0	443,840	0	0
12/10/2018	57,400	0	0	508,680	50	3	1,534,240	17,770	984	309,320	-10	-1	443,840	0	0
12/17/2018	57,400	0	0	508,680	0	0	1,554,800	20,560	1,138	310,270	950	53	443,840	0	0
12/24/2018	57,400	0	0	508,680	0	0	1,564,230	9,430	522	315,510	5,240	290	443,840	0	0
12/31/2018	57,400	0	0	508,680	0	0	1,564,230	0	0	332,380	16,870	934	443,840	0	0

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance.
GPD/AC = Gallons per day per acre; those that exceed 775 are in bold.
 # = Pump Maintenance; pumps off line.

Table 3.1-6. Monthly Tailings Collection and Injection Totals

	Sumps (gallons)	Dewatering (gallons)	Injection (gallons)
July	429,340	0	0
August	336,070	0	0
September	361,410	0	0
October	450,440	0	0
November	290,550	0	0
December	309,430	0	0

Table 3.1-7. Monthly Collection Totals by Aquifer and Area (gallons)

	On-Site Collection			South Off-Site Collection				North Off-Site Collection
	Alluvial	Upper Chinle	Middle Chinle	Alluvial	Upper Chinle	Middle Chinle	Lower Chinle	Alluvial
July	13,848,684	7,313,190	1,862,700	9,557,900	0	3,724,100	0	0
August	13,670,902	5,042,170	1,564,200	22,022,025	0	6,069,975	0	1,245,000
September	12,039,762	3,171,900	1,303,500	9,832,045	0	6,082,955	0	3,288,000
October	18,698,858	6,263,320	1,955,700	5,480,040	0	3,329,960	0	619,000
November	12,879,648	5,736,500	1,457,000	0	0	82,395	0	80,000
December	12,424,070	3,262,600	1,060,200	27,295	0	700,605	0	4,889,000

Table 3.1-8. Monthly Injection Totals by Aquifer and Area (gallons)

	On-Site Injection			South Off-Site Injection				North Off-Site Injection
	Alluvial	Upper Chinle	Middle Chinle	Alluvial	Upper Chinle	Middle Chinle	Lower Chinle	Alluvial
July	15,184,384	203,770	99,990	5,815,740	0	1,438,060	0	15,018,000
August	25,212,608	1,239,510	296,160	5,330,975	0	1,539,225	0	19,249,100
September	15,316,416	1,000,930	323,190	5,967,295	0	1,309,305	0	15,238,200
October	15,310,400	812,200	392,120	6,122,060	0	2,564,740	0	14,343,100
November	5,731,968	738,270	205,360	4,296,455	0	1,053,845	0	8,290,400
December	4,395,392	1,229,830	137,480	3,549,580	0	780,000	0	6,771,600

Table 3.1-9. Monthly Totals of Low-concentration and In-situ Injectate (gallons)

	L well Collection for Reinjection	*In-situ* Injection
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0

Table 3.1-10. Treatment System Influents Monthly Totals (gallons)

	300 GPM Zeolite	1200 GPM Zeolite	RO Plant
July	1,570,635	12,886,300	25,252,942
August	1,260	26,739,300	22,761,482
September	65,705	17,631,000	18,269,442
October	0	7,741,000	29,960,826
November	0	0	22,647,084
December	0	5,616,900	18,792,016

Table 3.1-11. Treatment System Effluent and Fresh Water Monthly Totals (gallons)

	Treatment Systems				Fresh Water Injection		
	Zeolite		RO Plant				
	Treated	Regeneration	Treated	Brine	On-Site	South Off-Site	North Off-Site
July	11,593,735	2,863,200	18,053,620	5,010,860	7,304,293	1,662,900	3,442,807
August	24,880,880	1,859,680	15,993,903	4,245,027	6,444,458	922,594	2,584,948
September	17,696,705	0	11,056,281	3,964,438	5,842,637	1,322,618	2,769,745
October	7,741,000	0	19,515,445	4,387,325	7,593,273	2,138,979	3,531,748
November	0	0	15,404,566	3,422,016	5,340,887	2,130,249	3,300,864
December	2,244,500	3,372,400	13,299,013	2,966,667	4,273,771	1,734,764	2,713,464

Table 3.2-1
Reversal Wells

Table 3.2-1. Depth to Water in Reversal Wells

Well Name	B	BA	DZ	KZ	S2	S5	SM	SN	SO	SP
MP Elev.	6570.9	6571.58	6590.53	6571.72	6573.72	6574.69	6578.74	6579.26	6578.79	6578.66
7/2/2018	37.50	39.92	53.45	34.76	38.86	13.59	41.87	41.77	42.66	42.38
7/9/2018	37.59	39.56	34.67	34.85	38.97	23.12	41.93	41.83	42.72	42.51
7/16/2018	37.47	39.91	52.61	34.99	38.81	44.04	41.94	41.84	42.68	42.57
7/23/2018	37.47	39.89	53.11	35.05	38.69	44.12	42.00	41.92	42.69	42.61
7/30/2018	37.44	40.12	39.73	35.11	38.60	44.04	41.96	41.90	42.59	42.53
8/6/2018	37.42	39.97	53.39	35.14	38.49	38.69	41.93	41.89	42.57	42.50
8/13/2018	37.45	40.35	53.37	43.86	38.34	43.92	41.83	41.84	32.44	42.27
8/20/2018	37.41	40.47	52.95	34.87	38.21	44.02	41.82	41.81	42.32	42.39
8/27/2018	37.41	39.03	52.34	34.89	38.11	43.85	41.70	41.75	42.26	42.27
9/3/2018	37.61	39.41	52.71	34.94	38.18	43.90	41.70	41.79	42.33	42.30
9/10/2018	37.63	39.16	53.41	43.76	38.04	43.84	41.74	41.77	42.29	42.28
9/17/2018	37.77	39.18	52.74	35.22		43.90	42.34	41.79	42.90	42.86
9/24/2018	38.05	40.70	53.70	34.80	39.50	44.17	41.95	42.04	42.45	42.54
10/1/2018	35.05	53.34	41.04	35.06	38.53	44.07	41.90	41.94	42.47	42.44
10/8/2018	38.15	40.45	41.54	35.28	38.70	44.20	42.10	42.08	42.70	42.70
10/15/2018	38.50	41.47	54.35	34.95	38.82	44.45	42.20	42.25	42.82	42.77
10/22/2018	38.37	41.57	54.13	35.18	38.35	44.22	42.02	42.05	42.58	42.67
10/29/2018	38.65	41.95	54.45	35.40	38.80	44.55	42.20	42.20	42.90	42.85
11/5/2018	38.80	42.05	54.04	35.34	38.70	44.39	42.19	42.22	42.81	42.79
11/12/2018	39.90	42.35	54.12	35.39	38.90	44.69	42.38	42.39	42.98	43.04
11/19/2018	39.35	40.61	53.20	36.37	39.68	23.68	42.91	42.81	43.59	43.44
11/26/2018	39.30	42.00	54.24	35.67		45.00	42.73	42.65	43.35	43.30
12/3/2018	39.21	41.83	54.42	35.61	49.66	44.90	42.61	42.60	41.32	41.04
12/10/2018	39.31	42.19	54.66	35.68	39.29	44.99	42.64	42.64	43.32	43.22
12/17/2018	39.29	41.05	52.89	35.82	39.30	44.85	42.63	42.53	42.30	41.08
12/19/2018	40.40	42.20	54.30	37.20		45.60	43.62	43.65	44.18	44.25

Table 3.4-1
Wells Drilled

Table 3.4-1. Wells Drilled and Abandoned

Well Name	Restoration Area

Wells Abandoned

Well Name	Restoration Area
943	On-Site
OLD #1	On-Site

Table 4.1-1
Water Quality Analysis for Well D1

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070435-003
Client Sample ID: D1

Report Date: 08/09/18
Collection Date: 07/11/18 12:52
Date Received: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/ RL QCL	Method	Analysis Date / By
MAJOR IONS						
175 Alkalinity, Total as CaCO3	332	mg/L		5	A2320 B	07/17/18 12:19 / ljl
206 Carbonate as CO3	<5	mg/L		5	A2320 B	07/17/18 12:19 / ljl
505 Bicarbonate as HCO3	404	mg/L		5	A2320 B	07/17/18 12:19 / ljl
007 Chloride	140	mg/L		1	E300.0	07/17/18 20:11 / ljl
108 Sulfate	772	mg/L	D	2	E300.0	07/17/18 20:11 / ljl
001 Calcium	197	mg/L		0.5	E200.7	07/18/18 02:01 / eli-b
002 Magnesium	41.6	mg/L		0.5	E200.7	07/18/18 02:01 / eli-b
003 Potassium	3.7	mg/L	D	0.7	E200.7	07/18/18 02:01 / eli-b
004 Sodium	322	mg/L	D	1	E200.7	07/18/18 02:01 / eli-b
PHYSICAL PROPERTIES						
010 Solids, Total Dissolved TDS @ 180 C	1810	mg/L	D	20	A2540 C	07/12/18 14:57 / mvr
NUTRIENTS						
310 Nitrogen, Nitrate+Nitrite as N	1.4	mg/L		0.1	E353.2	07/16/18 13:17 / dmb
METALS, DISSOLVED						
036 Molybdenum	1.91	mg/L		0.001	E200.8	07/17/18 02:53 / eli-b
040 Selenium	0.059	mg/L		0.001	E200.8	07/17/18 02:53 / eli-b
015 Uranium	1.42	mg/L		0.0003	E200.8	07/17/18 02:53 / eli-b
244 Uranium Precision (±)	0.229	mg/L		0.00005	E200.8	07/17/18 02:53 / eli-b
113 Uranium, Activity	9.6E-07	uCi/mL		2.0E-10	E200.8	07/17/18 02:53 / eli-b
114 Uranium, Activity precision (±)	1.6E-07	uCi/mL		3.0E-11	E200.8	07/17/18 02:53 / eli-b
042 Vanadium	0.002	mg/L	L	0.001	E200.8	07/17/18 02:53 / eli-b
RADIONUCLIDES, DISSOLVED						
045 Radium 226	0.4	pCi/L			E903.0	07/31/18 13:07 / arh
245 Radium 226 precision (±)	0.2	pCi/L			E903.0	07/31/18 13:07 / arh
Radium 226 MDC	0.3	pCi/L			E903.0	07/31/18 13:07 / arh
057 Radium 228	1.6	pCi/L	U		RA-05	07/26/18 13:00 / plj
257 Radium 228 precision (±)	1.2	pCi/L			RA-05	07/26/18 13:00 / plj
Radium 228 MDC	2.0	pCi/L			RA-05	07/26/18 13:00 / plj
048 Thorium 230	0.02	pCi/L	U		E908.0	08/01/18 17:27 / cnh
248 Thorium 230 precision (±)	0.05	pCi/L			E908.0	08/01/18 17:27 / cnh
Thorium 230 MDC	0.09	pCi/L			E908.0	08/01/18 17:27 / cnh
DATA QUALITY						
079 Solids, Total Dissolved - Calculated	1700	mg/L			A1030 E	07/23/18 08:12 / mav
192 A/C Balance	1.09	%			A1030 E	07/23/18 08:12 / mav
194 Anions	26.8	meq/L			A1030 E	07/23/18 08:12 / mav
195 Cations	27.3	meq/L			A1030 E	07/23/18 08:12 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070435-003
Client Sample ID: D1

Report Date: 08/09/18
Collection Date: 07/11/18 12:52
Date Received: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
DATA QUALITY							
200 TDS Ratio	1.06	unitless				A1030 E	07/23/18 08:12 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18090668-001
Client Sample ID: D1

Report Date: 10/01/18
Collection Date: 09/17/18 10:14
Date Received: 09/19/18
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS								
175	Alkalinity, Total as CaCO3	361	mg/L		5		A2320 B	09/21/18 11:52 / ljl
206	Carbonate as CO3	<5	mg/L		5		A2320 B	09/21/18 11:52 / ljl
505	Bicarbonate as HCO3	440	mg/L		5		A2320 B	09/21/18 11:52 / ljl
007	Chloride	153	mg/L		1		E300.0	09/21/18 09:04 / ljl
031	Fluoride	0.4	mg/L	D	0.2		E300.0	09/21/18 09:04 / ljl
108	Sulfate	746	mg/L	D	2		E300.0	09/21/18 09:04 / ljl
001	Calcium	189	mg/L		1		E200.7	09/21/18 23:20 / eli-b
002	Magnesium	40	mg/L		1		E200.7	09/21/18 23:20 / eli-b
003	Potassium	3	mg/L		1		E200.7	09/21/18 23:20 / eli-b
004	Sodium	291	mg/L		1		E200.7	09/21/18 23:20 / eli-b
NON-METALS								
072	Organic Carbon, Dissolved (DOC)	1.2	mg/L		0.5		A5310 C	09/25/18 21:45 / dmb
	Sulfide	<0.04	mg/L		0.04		A4500-S D	09/21/18 12:50 / eli-b
NUTRIENTS								
	Nitrogen, Ammonia as N	0.04	mg/L	J	0.05		E350.1	09/25/18 13:47 / dmb
310	Nitrogen, Nitrate+Nitrite as N	1.50	mg/L	D	0.05		E353.2	09/20/18 13:38 / dmb
METALS, DISSOLVED								
022	Aluminum	0.0009	mg/L	J	0.03		E200.8	09/28/18 05:18 / eli-b
024	Barium	0.012	mg/L	J	0.05		E200.7	09/21/18 23:20 / eli-b
032	Iron	0.005	mg/L	J	0.02		E200.8	09/23/18 01:31 / eli-b
034	Manganese	0.0010	mg/L	J	0.001		E200.8	09/23/18 01:31 / eli-b
036	Molybdenum	2.31	mg/L		0.001		E200.8	09/23/18 01:31 / eli-b
069	Phosphorus	<0.4	mg/L	D	0.4		E200.7	09/24/18 16:14 / eli-b
040	Selenium	0.058	mg/L		0.001		E200.8	09/23/18 01:31 / eli-b
080	Silica	26.9	mg/L		0.2		E200.8	09/23/18 01:31 / eli-b
015	Uranium	1.65	mg/L		0.0003		E200.8	09/23/18 01:31 / eli-b
042	Vanadium	0.003	mg/L	J	0.01		E200.8	09/23/18 01:31 / eli-b
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1700	mg/L				A1030 E	09/28/18 16:28 / mav
CLIENT PROVIDED FIELD PARAMETERS								
109	Field pH	7.21	s.u.				FIELD	09/17/18 10:14 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18120219-003
Client Sample ID: D1

Report Date: 01/02/19
Collection Date: 12/05/18 10:03
Date Received: 12/07/18
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS								
175	Alkalinity, Total as CaCO3	314	mg/L		5		A2320 B	12/11/18 14:40 / ljl
206	Carbonate as CO3	<5	mg/L		5		A2320 B	12/11/18 14:40 / ljl
505	Bicarbonate as HCO3	383	mg/L		5		A2320 B	12/11/18 14:40 / ljl
007	Chloride	130	mg/L		1		E300.0	12/10/18 22:44 / ljl
031	Fluoride	0.4	mg/L	D	0.2		E300.0	12/10/18 22:44 / ljl
108	Sulfate	723	mg/L	D	2		E300.0	12/10/18 22:44 / ljl
001	Calcium	174	mg/L		1		E200.7	12/14/18 21:24 / jcg
002	Magnesium	37	mg/L		1		E200.7	12/14/18 21:24 / jcg
003	Potassium	3	mg/L		1		E200.7	12/17/18 02:12 / jcg
004	Sodium	257	mg/L		1		E200.7	12/17/18 02:12 / jcg
NON-METALS								
072	Organic Carbon, Dissolved (DOC)	1.3	mg/L		0.5		A5310 C	12/07/18 17:16 / dmb
INORGANICS								
	Sulfide	0.91	mg/L	HU	2		E376.1	12/14/18 00:00 / ta-a
	*** Sulfide subbed to Test America.							
NUTRIENTS								
	Nitrogen, Ammonia as N	0.04	mg/L	J	0.05		E350.1	12/12/18 15:11 / dmb
310	Nitrogen, Nitrate+Nitrite as N	1.18	mg/L		0.01		E353.2	12/10/18 12:55 / dmb
METALS, DISSOLVED								
022	Aluminum	<0.03	mg/L		0.03		E200.8	12/12/18 02:45 / jcg
024	Barium	0.012	mg/L	J	0.05		E200.8	12/10/18 05:09 / jcg
032	Iron	0.006	mg/L	J	0.02		E200.8	12/13/18 05:12 / jcg
034	Manganese	0.002	mg/L		0.001		E200.8	12/10/18 05:09 / jcg
036	Molybdenum	1.31	mg/L		0.001		E200.8	12/10/18 05:09 / jcg
069	Phosphorus	<0.1	mg/L		0.1		E200.7	12/14/18 21:24 / jcg
040	Selenium	0.052	mg/L		0.001		E200.8	12/10/18 05:09 / jcg
080	Silica	23.5	mg/L		0.2		E200.7	12/14/18 21:24 / jcg
015	Uranium	0.953	mg/L		0.0003		E200.8	12/10/18 05:09 / jcg
042	Vanadium	0.0009	mg/L	J	0.01		E200.8	12/13/18 05:12 / jcg
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1600	mg/L				A1030 E	12/19/18 01:38 / tlf
CLIENT PROVIDED FIELD PARAMETERS								
109	Field pH	7.50	s.u.				FIELD	12/05/18 10:03 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

Table 4.1-2
Water Quality Analysis for Well DD

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18080704-001
Client Sample ID: DD

Report Date: 08/29/18
Collection Date: 08/16/18 11:25
Date Received: 08/17/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	73	mg/L		1		E300.0	08/22/18 22:46 / ljl
108 Sulfate	2040	mg/L	D	4		E300.0	08/23/18 19:15 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	3540	mg/L	D	40		A2540 C	08/21/18 10:23 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.011	mg/L		0.001		E200.8	08/24/18 02:08 / eli-b
040 Selenium	0.056	mg/L		0.001		E200.8	08/24/18 02:08 / eli-b
015 Uranium	0.112	mg/L		0.0003		E200.8	08/24/18 02:08 / eli-b
244 Uranium Precision (±)	0.0180	mg/L		0.00005		E200.8	08/24/18 02:08 / eli-b
113 Uranium, Activity	7.6E-08	uCi/mL		2.0E-10		E200.8	08/24/18 02:08 / eli-b
114 Uranium, Activity precision (±)	1.2E-08	uCi/mL		3.0E-11		E200.8	08/24/18 02:08 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.14	s.u.				FIELD	08/16/18 11:25 / ***

*** Field data provided by client

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18090668-003
Client Sample ID: DD

Report Date: 10/01/18
Collection Date: 09/17/18 13:23
Date Received: 09/19/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	274	mg/L		5		A2320 B	09/21/18 12:09 / ljl
206 Carbonate as CO3	<5	mg/L		5		A2320 B	09/21/18 12:09 / ljl
505 Bicarbonate as HCO3	334	mg/L		5		A2320 B	09/21/18 12:09 / ljl
007 Chloride	74	mg/L		1		E300.0	09/24/18 17:46 / ljl
031 Fluoride	0.4	mg/L	D	0.2		E300.0	09/24/18 17:46 / ljl
108 Sulfate	2040	mg/L	D	4		E300.0	09/21/18 09:42 / ljl
001 Calcium	462	mg/L		1		E200.7	09/21/18 23:28 / eli-b
002 Magnesium	103	mg/L		1		E200.7	09/21/18 23:28 / eli-b
003 Potassium	6	mg/L		1		E200.7	09/21/18 23:28 / eli-b
004 Sodium	363	mg/L		1		E200.7	09/21/18 23:28 / eli-b
NON-METALS							
072 Organic Carbon, Dissolved (DOC)	2.6	mg/L		0.5		A5310 C	09/25/18 22:25 / dmb
Sulfide	<0.04	mg/L		0.04		A4500-S D	09/21/18 12:50 / eli-b
NUTRIENTS							
Nitrogen, Ammonia as N	0.02	mg/L	J	0.05		E350.1	09/25/18 13:50 / dmb
310 Nitrogen, Nitrate+Nitrite as N	12.1	mg/L	D	0.05		E353.2	09/20/18 13:40 / dmb
METALS, DISSOLVED							
022 Aluminum	<0.03	mg/L		0.03		E200.8	09/23/18 02:56 / eli-b
024 Barium	0.007	mg/L	J	0.05		E200.7	09/21/18 23:28 / eli-b
032 Iron	0.008	mg/L	J	0.02		E200.8	09/23/18 02:56 / eli-b
034 Manganese	0.344	mg/L		0.001		E200.8	09/23/18 02:56 / eli-b
036 Molybdenum	0.003	mg/L		0.001		E200.8	09/23/18 02:56 / eli-b
069 Phosphorus	<0.4	mg/L	D	0.4		E200.7	09/24/18 16:42 / eli-b
040 Selenium	0.069	mg/L		0.001		E200.8	09/23/18 02:56 / eli-b
080 Silica	17.5	mg/L		0.2		E200.8	09/23/18 02:56 / eli-b
015 Uranium	0.118	mg/L		0.0003		E200.8	09/23/18 02:56 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	09/23/18 02:56 / eli-b
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	3300	mg/L				A1030 E	09/28/18 16:28 / mav
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.22	s.u.				FIELD	09/17/18 13:23 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100478-002
Client Sample ID: DD

Report Date: 10/24/18
Collection Date: 10/10/18 11:12
Date Received: 10/11/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	69	mg/L		1		E300.0	10/13/18 09:59 / ljl
108 Sulfate	2090	mg/L	D	4		E300.0	10/13/18 09:59 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	3600	mg/L	D	40		A2540 C	10/12/18 12:24 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.002	mg/L		0.001		E200.8	10/20/18 02:50 / eli-b
040 Selenium	0.091	mg/L		0.001		E200.8	10/20/18 02:50 / eli-b
015 Uranium	0.0942	mg/L		0.0003		E200.8	10/20/18 02:50 / eli-b
244 Uranium Precision (±)	0.0152	mg/L		0.00005		E200.8	10/20/18 02:50 / eli-b
113 Uranium, Activity	6.4E-08	uCi/mL		2.0E-10		E200.8	10/20/18 02:50 / eli-b
114 Uranium, Activity precision (±)	1.0E-08	uCi/mL		3.0E-11		E200.8	10/20/18 02:50 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.19	s.u.				FIELD	10/10/18 11:12 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18110828-001
Client Sample ID: DD

Report Date: 12/12/18
Collection Date: 11/29/18 13:10
Date Received: 11/30/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	71	mg/L		1		E300.0	12/05/18 19:30 / ljl
108 Sulfate	2050	mg/L	D	4		E300.0	12/05/18 19:30 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	3540	mg/L	D	40		A2540 C	11/30/18 16:01 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.002	mg/L		0.001		E200.8	12/07/18 18:55 / jcg
040 Selenium	0.075	mg/L		0.001		E200.8	12/05/18 22:36 / jcg
015 Uranium	0.111	mg/L		0.0003		E200.8	12/05/18 22:36 / jcg
244 Uranium Precision (±)	0.0179	mg/L		0.00005		E200.8	12/05/18 22:36 / jcg
113 Uranium, Activity	7.5E-08	uCi/mL		2.0E-10		E200.8	12/05/18 22:36 / jcg
114 Uranium, Activity precision (±)	1.2E-08	uCi/mL		3.0E-11		E200.8	12/05/18 22:36 / jcg
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.22	s.u.				0	11/29/18 13:10 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18120219-004
Client Sample ID: DD

Report Date: 01/02/19
Collection Date: 12/05/18 14:09
Date Received: 12/07/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	268	mg/L		5		A2320 B	12/11/18 14:48 / ljl
206 Carbonate as CO3	<5	mg/L		5		A2320 B	12/11/18 14:48 / ljl
505 Bicarbonate as HCO3	327	mg/L		5		A2320 B	12/11/18 14:48 / ljl
007 Chloride	71	mg/L		1		E300.0	12/12/18 11:48 / ljl
031 Fluoride	0.4	mg/L	D	0.2		E300.0	12/12/18 11:48 / ljl
108 Sulfate	2090	mg/L	D	4		E300.0	12/10/18 23:30 / ljl
001 Calcium	456	mg/L		1		E200.7	12/14/18 21:28 / jcg
002 Magnesium	112	mg/L		1		E200.7	12/14/18 21:28 / jcg
003 Potassium	6	mg/L		1		E200.7	12/17/18 02:16 / jcg
004 Sodium	364	mg/L		1		E200.7	12/17/18 02:16 / jcg
NON-METALS							
072 Organic Carbon, Dissolved (DOC)	2.7	mg/L		0.5		A5310 C	12/07/18 18:06 / dmb
INORGANICS							
Sulfide	0.91	mg/L	HU	2		E376.1	12/14/18 00:00 / ta-a
*** Sulfide subbed to Test America.							
NUTRIENTS							
Nitrogen, Ammonia as N	<0.05	mg/L		0.05		E350.1	12/12/18 15:12 / dmb
310 Nitrogen, Nitrate+Nitrite as N	10.8	mg/L	D	0.1		E353.2	12/10/18 12:56 / dmb
METALS, DISSOLVED							
022 Aluminum	<0.03	mg/L		0.03		E200.8	12/12/18 02:49 / jcg
024 Barium	0.0087	mg/L	J	0.05		E200.8	12/10/18 05:13 / jcg
032 Iron	0.008	mg/L	J	0.02		E200.8	12/13/18 05:41 / jcg
034 Manganese	0.504	mg/L		0.001		E200.8	12/10/18 05:13 / jcg
036 Molybdenum	0.013	mg/L		0.001		E200.8	12/10/18 05:13 / jcg
069 Phosphorus	<0.1	mg/L		0.1		E200.7	12/14/18 21:28 / jcg
040 Selenium	0.080	mg/L		0.001		E200.8	12/10/18 05:13 / jcg
080 Silica	17.2	mg/L		0.2		E200.7	12/14/18 21:28 / jcg
015 Uranium	0.105	mg/L		0.0003		E200.8	12/10/18 05:13 / jcg
042 Vanadium	<0.01	mg/L		0.01		E200.8	12/13/18 05:41 / jcg
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	3300	mg/L				A1030 E	12/19/18 01:39 / tlf
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.41	s.u.				FIELD	12/05/18 14:09 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

Table 4.1-3
Water Quality Analyses for Well DD2

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18080704-002
Client Sample ID: DD2

Report Date: 08/29/18
Collection Date: 08/16/18 10:20
Date Received: 08/17/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	67	mg/L		1		E300.0	08/22/18 23:43 / ljl
108 Sulfate	1570	mg/L	D	4		E300.0	08/22/18 23:43 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2720	mg/L	D	20		A2540 C	08/21/18 10:23 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.003	mg/L		0.001		E200.8	08/24/18 02:12 / eli-b
040 Selenium	<0.001	mg/L		0.001		E200.8	08/24/18 02:12 / eli-b
015 Uranium	0.209	mg/L		0.0003		E200.8	08/24/18 02:12 / eli-b
244 Uranium Precision (±)	0.0337	mg/L		0.00005		E200.8	08/24/18 02:12 / eli-b
113 Uranium, Activity	1.4E-07	uCi/mL		2.0E-10		E200.8	08/24/18 02:12 / eli-b
114 Uranium, Activity precision (±)	2.3E-08	uCi/mL		3.0E-11		E200.8	08/24/18 02:12 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	6.98	s.u.				FIELD	08/16/18 10:20 / ***

*** Field data provided by client

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100478-001
Client Sample ID: DD2

Report Date: 10/24/18
Collection Date: 10/10/18 13:25
Date Received: 10/11/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	63	mg/L		1		E300.0	10/13/18 09:42 / ljl
108 Sulfate	1530	mg/L	D	4		E300.0	10/13/18 09:42 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2700	mg/L	D	20		A2540 C	10/12/18 12:23 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.002	mg/L		0.001		E200.8	10/20/18 02:46 / eli-b
040 Selenium	<0.001	mg/L		0.001		E200.8	10/20/18 02:46 / eli-b
015 Uranium	0.209	mg/L		0.0003		E200.8	10/20/18 02:46 / eli-b
244 Uranium Precision (±)	0.0338	mg/L		0.00005		E200.8	10/20/18 02:46 / eli-b
113 Uranium, Activity	1.4E-07	uCi/mL		2.0E-10		E200.8	10/20/18 02:46 / eli-b
114 Uranium, Activity precision (±)	2.3E-08	uCi/mL		3.0E-11		E200.8	10/20/18 02:46 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.01	s.u.				FIELD	10/10/18 13:25 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18110828-003
Client Sample ID: DD2

Report Date: 12/12/18
Collection Date: 11/29/18 08:48
Date Received: 11/30/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	61	mg/L		1		E300.0	12/05/18 20:08 / ljl
108 Sulfate	1470	mg/L	D	4		E300.0	12/05/18 20:08 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2700	mg/L	D	20		A2540 C	11/30/18 16:02 / kjp
METALS, DISSOLVED							
036 Molybdenum	<0.001	mg/L		0.001		E200.8	12/05/18 22:44 / jcg
040 Selenium	0.003	mg/L		0.001		E200.8	12/05/18 22:44 / jcg
015 Uranium	0.212	mg/L		0.0003		E200.8	12/05/18 22:44 / jcg
244 Uranium Precision (±)	0.0342	mg/L		0.00005		E200.8	12/05/18 22:44 / jcg
113 Uranium, Activity	1.4E-07	uCi/mL		2.0E-10		E200.8	12/05/18 22:44 / jcg
114 Uranium, Activity precision (±)	2.3E-08	uCi/mL		3.0E-11		E200.8	12/05/18 22:44 / jcg
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	6.98	s.u.				0	11/29/18 08:48 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

Table 4.1-4
Water Quality Analyses for Well P

Well P Was Not Sampled in the 2nd Half of 2018

Table 4.1-5
Water Quality Analyses for Well S4

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070496-001
Client Sample ID: S4

Report Date: 08/10/18
Collection Date: 07/12/18 11:23
Date Received: 07/13/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	432	mg/L		5		A2320 B	07/17/18 18:25 / ljl
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/17/18 18:25 / ljl
505 Bicarbonate as HCO3	527	mg/L		5		A2320 B	07/17/18 18:25 / ljl
007 Chloride	177	mg/L		1		E300.0	07/18/18 22:40 / ljl
108 Sulfate	754	mg/L	D	2		E300.0	07/18/18 22:40 / ljl
001 Calcium	206	mg/L		0.5		E200.8	07/20/18 02:58 / eli-b
002 Magnesium	59.7	mg/L		0.5		E200.8	07/20/18 02:58 / eli-b
003 Potassium	4.1	mg/L		0.5		E200.8	07/20/18 02:58 / eli-b
004 Sodium	266	mg/L		0.5		E200.8	07/20/18 02:58 / eli-b
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1820	mg/L	D	20		A2540 C	07/16/18 08:51 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.0	mg/L		0.1		E353.2	07/20/18 14:20 / dmb
METALS, DISSOLVED							
036 Molybdenum	0.301	mg/L		0.001		E200.8	07/20/18 02:58 / eli-b
040 Selenium	0.029	mg/L		0.001		E200.8	07/20/18 02:58 / eli-b
015 Uranium	0.111	mg/L		0.0003		E200.8	07/20/18 02:58 / eli-b
244 Uranium Precision (±)	0.0180	mg/L		0.00005		E200.8	07/20/18 02:58 / eli-b
113 Uranium, Activity	7.5E-08	uCi/mL		2.0E-10		E200.8	07/20/18 02:58 / eli-b
114 Uranium, Activity precision (±)	1.2E-08	uCi/mL		3.0E-11		E200.8	07/20/18 02:58 / eli-b
042 Vanadium	<0.001	mg/L	L	0.001		E200.8	07/25/18 10:01 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.3	pCi/L				E903.0	08/02/18 12:28 / arh
245 Radium 226 precision (±)	0.2	pCi/L				E903.0	08/02/18 12:28 / arh
Radium 226 MDC	0.2	pCi/L				E903.0	08/02/18 12:28 / arh
057 Radium 228	1.6	pCi/L	U			RA-05	07/27/18 11:09 / plj
257 Radium 228 precision (±)	1.0	pCi/L				RA-05	07/27/18 11:09 / plj
Radium 228 MDC	2.0	pCi/L				RA-05	07/27/18 11:09 / plj
048 Thorium 230	0.03	pCi/L	U			E908.0	08/06/18 17:42 / cnh
248 Thorium 230 precision (±)	0.06	pCi/L				E908.0	08/06/18 17:42 / cnh
Thorium 230 MDC	0.1	pCi/L				E908.0	08/06/18 17:42 / cnh
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1800	mg/L				A1030 E	07/27/18 09:24 / mav
192 A/C Balance	-4.49	%				A1030 E	07/27/18 09:24 / mav
194 Anions	29.4	meq/L				A1030 E	07/27/18 09:24 / mav
195 Cations	26.9	meq/L				A1030 E	07/27/18 09:24 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070496-001
Client Sample ID: S4

Report Date: 08/10/18
Collection Date: 07/12/18 11:23
Date Received: 07/13/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
DATA QUALITY							
200 TDS Ratio	1.03	unitless				A1030 E	07/27/18 09:24 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18090668-005
Client Sample ID: S4

Report Date: 10/01/18
Collection Date: 09/17/18 08:20
Date Received: 09/19/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	416	mg/L		5		A2320 B	09/21/18 12:32 / ljl
206 Carbonate as CO3	<5	mg/L		5		A2320 B	09/21/18 12:32 / ljl
505 Bicarbonate as HCO3	507	mg/L		5		A2320 B	09/21/18 12:32 / ljl
007 Chloride	169	mg/L		1		E300.0	09/21/18 10:20 / ljl
031 Fluoride	0.3	mg/L		0.1		E300.0	09/21/18 10:20 / ljl
108 Sulfate	716	mg/L		1		E300.0	09/21/18 10:20 / ljl
001 Calcium	209	mg/L		1		E200.7	09/21/18 23:36 / eli-b
002 Magnesium	53	mg/L		1		E200.7	09/21/18 23:36 / eli-b
003 Potassium	4	mg/L		1		E200.7	09/21/18 23:36 / eli-b
004 Sodium	259	mg/L		1		E200.7	09/21/18 23:36 / eli-b
NON-METALS							
072 Organic Carbon, Dissolved (DOC)	1.0	mg/L		0.5		A5310 C	09/25/18 23:04 / dmb
Sulfide	<0.04	mg/L		0.04		A4500-S D	09/21/18 12:50 / eli-b
NUTRIENTS							
Nitrogen, Ammonia as N	0.02	mg/L	J	0.05		E350.1	09/25/18 13:52 / dmb
310 Nitrogen, Nitrate+Nitrite as N	1.08	mg/L		0.01		E353.2	09/20/18 13:45 / dmb
METALS, DISSOLVED							
022 Aluminum	<0.03	mg/L		0.03		E200.8	09/28/18 05:22 / eli-b
024 Barium	0.012	mg/L	J	0.05		E200.7	09/21/18 23:36 / eli-b
032 Iron	<0.02	mg/L		0.02		E200.7	09/21/18 23:36 / eli-b
034 Manganese	0.0003	mg/L	J	0.001		E200.8	09/23/18 03:04 / eli-b
036 Molybdenum	0.339	mg/L		0.001		E200.8	09/23/18 03:04 / eli-b
069 Phosphorus	<0.4	mg/L	D	0.4		E200.7	09/24/18 16:50 / eli-b
040 Selenium	0.031	mg/L		0.001		E200.8	09/23/18 03:04 / eli-b
080 Silica	26.4	mg/L		0.2		E200.8	09/23/18 03:04 / eli-b
015 Uranium	0.123	mg/L		0.0003		E200.8	09/23/18 03:04 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	09/23/18 03:04 / eli-b
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1700	mg/L				A1030 E	09/28/18 16:29 / mav
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.22	s.u.				FIELD	09/17/18 08:20 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18120219-005
Client Sample ID: S4

Report Date: 01/02/19
Collection Date: 12/05/18 12:25
Date Received: 12/07/18
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS								
175	Alkalinity, Total as CaCO3	401	mg/L		5		A2320 B	12/11/18 14:56 / ljl
206	Carbonate as CO3	<5	mg/L		5		A2320 B	12/11/18 14:56 / ljl
505	Bicarbonate as HCO3	489	mg/L		5		A2320 B	12/11/18 14:56 / ljl
007	Chloride	159	mg/L		1		E300.0	12/12/18 12:07 / ljl
031	Fluoride	0.3	mg/L		0.1		E300.0	12/12/18 12:07 / ljl
108	Sulfate	716	mg/L		1		E300.0	12/12/18 12:07 / ljl
001	Calcium	201	mg/L		1		E200.7	12/14/18 21:32 / jcg
002	Magnesium	54	mg/L		1		E200.7	12/14/18 21:32 / jcg
003	Potassium	4	mg/L		1		E200.7	12/17/18 02:20 / jcg
004	Sodium	250	mg/L		1		E200.7	12/17/18 02:20 / jcg
NON-METALS								
072	Organic Carbon, Dissolved (DOC)	1.0	mg/L		0.5		A5310 C	12/07/18 18:22 / dmb
INORGANICS								
	Sulfide	0.91	mg/L	HU	2		E376.1	12/14/18 00:00 / ta-a
	*** Sulfide subbed to Test America.							
NUTRIENTS								
	Nitrogen, Ammonia as N	<0.05	mg/L		0.05		E350.1	12/12/18 15:13 / dmb
310	Nitrogen, Nitrate+Nitrite as N	0.99	mg/L		0.01		E353.2	12/10/18 12:57 / dmb
METALS, DISSOLVED								
022	Aluminum	<0.03	mg/L		0.03		E200.8	12/17/18 00:16 / jcg
024	Barium	0.014	mg/L	J	0.05		E200.8	12/10/18 05:18 / jcg
032	Iron	0.006	mg/L	J	0.02		E200.8	12/13/18 05:46 / jcg
034	Manganese	0.0003	mg/L	J	0.001		E200.8	12/10/18 05:18 / jcg
036	Molybdenum	0.365	mg/L		0.001		E200.8	12/10/18 05:18 / jcg
069	Phosphorus	<0.1	mg/L		0.1		E200.7	12/14/18 21:32 / jcg
040	Selenium	0.032	mg/L		0.001		E200.8	12/10/18 05:18 / jcg
080	Silica	24.9	mg/L		0.2		E200.7	12/14/18 21:32 / jcg
015	Uranium	0.117	mg/L		0.0003		E200.8	12/10/18 05:18 / jcg
042	Vanadium	<0.01	mg/L		0.01		E200.8	12/13/18 05:46 / jcg
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1700	mg/L				A1030 E	12/19/18 01:40 / tlf
CLIENT PROVIDED FIELD PARAMETERS								
109	Field pH	7.31	s.u.				FIELD	12/05/18 12:25 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

Table 4.1-6
Water Quality Analyses for Well X

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070435-002
Client Sample ID: X

Report Date: 08/09/18
Collection Date: 07/11/18 12:20
Date Received: 07/12/18
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS								
175	Alkalinity, Total as CaCO3	263	mg/L		5		A2320 B	07/17/18 12:11 / ljl
206	Carbonate as CO3	<5	mg/L		5		A2320 B	07/17/18 12:11 / ljl
505	Bicarbonate as HCO3	321	mg/L		5		A2320 B	07/17/18 12:11 / ljl
007	Chloride	114	mg/L		1		E300.0	07/17/18 19:13 / ljl
108	Sulfate	438	mg/L	D	2		E300.0	07/17/18 19:13 / ljl
001	Calcium	153	mg/L		0.5		E200.7	07/18/18 01:57 / eli-b
002	Magnesium	34.1	mg/L		0.5		E200.7	07/18/18 01:57 / eli-b
003	Potassium	4.7	mg/L		0.5		E200.7	07/18/18 01:57 / eli-b
004	Sodium	168	mg/L		0.5		E200.7	07/18/18 01:57 / eli-b
PHYSICAL PROPERTIES								
009	pH	7.42	s.u.	H	0.01		A4500-H B	07/16/18 12:08 / mvr
	pH Measurement Temp	15	°C				A4500-H B	07/16/18 12:08 / mvr
010	Solids, Total Dissolved TDS @ 180 C	1170	mg/L		10		A2540 C	07/12/18 14:57 / mvr
NUTRIENTS								
310	Nitrogen, Nitrate+Nitrite as N	1.4	mg/L		0.1		E353.2	07/16/18 13:16 / dmb
METALS, DISSOLVED								
034	Manganese	<0.001	mg/L		0.001		E200.8	07/17/18 02:49 / eli-b
036	Molybdenum	0.078	mg/L		0.001		E200.8	07/18/18 23:19 / eli-b
040	Selenium	0.014	mg/L		0.001		E200.8	07/17/18 02:49 / eli-b
015	Uranium	0.0404	mg/L		0.0003		E200.8	07/17/18 02:49 / eli-b
244	Uranium Precision (±)	0.00653	mg/L		0.00005		E200.8	07/17/18 02:49 / eli-b
113	Uranium, Activity	2.7E-08	uCi/mL		2.0E-10		E200.8	07/17/18 02:49 / eli-b
114	Uranium, Activity precision (±)	4.4E-09	uCi/mL		3.0E-11		E200.8	07/17/18 02:49 / eli-b
042	Vanadium	0.010	mg/L	L	0.001		E200.8	07/17/18 02:49 / eli-b
RADIONUCLIDES, DISSOLVED								
045	Radium 226	0.2	pCi/L	U			E903.0	07/31/18 13:07 / arh
245	Radium 226 precision (±)	0.2	pCi/L				E903.0	07/31/18 13:07 / arh
	Radium 226 MDC	0.2	pCi/L				E903.0	07/31/18 13:07 / arh
057	Radium 228	1.0	pCi/L	U			RA-05	07/26/18 14:45 / plj
257	Radium 228 precision (±)	1.1	pCi/L				RA-05	07/26/18 14:45 / plj
	Radium 228 MDC	2.1	pCi/L				RA-05	07/26/18 14:45 / plj
048	Thorium 230	0.03	pCi/L	U			E908.0	08/01/18 17:27 / cnh
248	Thorium 230 precision (±)	0.05	pCi/L				E908.0	08/01/18 17:27 / cnh
	Thorium 230 MDC	0.09	pCi/L				E908.0	08/01/18 17:27 / cnh
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1100	mg/L				A1030 E	07/23/18 08:12 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18070435-002
Client Sample ID: X

Report Date: 08/09/18
Collection Date: 07/11/18 12:20
Date Received: 07/12/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
DATA QUALITY							
192 A/C Balance	0.40	%				A1030 E	07/23/18 08:12 / mav
194 Anions	17.7	meq/L				A1030 E	07/23/18 08:12 / mav
195 Cations	17.9	meq/L				A1030 E	07/23/18 08:12 / mav
200 TDS Ratio	1.07	unitless				A1030 E	07/23/18 08:12 / mav

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18090668-002
Client Sample ID: X

Report Date: 10/01/18
Collection Date: 09/17/18 11:15
Date Received: 09/19/18
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/ RL QCL	Method	Analysis Date / By
MAJOR IONS						
175 Alkalinity, Total as CaCO3	217	mg/L		5	A2320 B	09/21/18 12:01 / ljl
206 Carbonate as CO3	<5	mg/L		5	A2320 B	09/21/18 12:01 / ljl
505 Bicarbonate as HCO3	265	mg/L		5	A2320 B	09/21/18 12:01 / ljl
007 Chloride	113	mg/L		1	E300.0	09/21/18 09:23 / ljl
031 Fluoride	0.3	mg/L	D	0.2	E300.0	09/21/18 09:23 / ljl
108 Sulfate	566	mg/L	D	2	E300.0	09/21/18 09:23 / ljl
001 Calcium	168	mg/L		1	E200.7	09/21/18 23:24 / eli-b
002 Magnesium	36	mg/L		1	E200.7	09/21/18 23:24 / eli-b
003 Potassium	5	mg/L		1	E200.7	09/21/18 23:24 / eli-b
004 Sodium	156	mg/L		1	E200.7	09/21/18 23:24 / eli-b
NON-METALS						
072 Organic Carbon, Dissolved (DOC)	0.7	mg/L		0.5	A5310 C	09/25/18 22:06 / dmb
Sulfide	<0.04	mg/L		0.04	A4500-S D	09/21/18 12:50 / eli-b
NUTRIENTS						
Nitrogen, Ammonia as N	0.02	mg/L	J	0.05	E350.1	09/25/18 13:48 / dmb
310 Nitrogen, Nitrate+Nitrite as N	1.75	mg/L		0.01	E353.2	09/20/18 13:39 / dmb
METALS, DISSOLVED						
022 Aluminum	0.0028	mg/L	J	0.03	E200.8	09/23/18 02:52 / eli-b
024 Barium	0.024	mg/L	J	0.05	E200.7	09/21/18 23:24 / eli-b
032 Iron	0.010	mg/L	J	0.02	E200.8	09/23/18 02:52 / eli-b
034 Manganese	0.0003	mg/L	J	0.001	E200.8	09/23/18 02:52 / eli-b
036 Molybdenum	0.129	mg/L		0.001	E200.8	09/23/18 02:52 / eli-b
069 Phosphorus	<0.1	mg/L		0.1	E200.7	09/24/18 16:38 / eli-b
040 Selenium	0.020	mg/L		0.001	E200.8	09/23/18 02:52 / eli-b
080 Silica	15.7	mg/L		0.2	E200.8	09/23/18 02:52 / eli-b
015 Uranium	0.0450	mg/L		0.0003	E200.8	09/23/18 02:52 / eli-b
042 Vanadium	0.01	mg/L		0.01	E200.8	09/23/18 02:52 / eli-b
DATA QUALITY						
079 Solids, Total Dissolved - Calculated	1200	mg/L			A1030 E	09/28/18 16:28 / mav
CLIENT PROVIDED FIELD PARAMETERS						
109 Field pH	7.53	s.u.			FIELD	09/17/18 11:15 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
J - Estimated value. The analyte was present but less than the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100478-003
Client Sample ID: X

Report Date: 10/24/18
Collection Date: 10/10/18 09:41
Date Received: 10/11/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	118	mg/L		1		E300.0	10/13/18 10:17 / ljl
108 Sulfate	635	mg/L	D	2		E300.0	10/13/18 10:17 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1380	mg/L	D	20		A2540 C	10/12/18 12:24 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.117	mg/L		0.001		E200.8	10/20/18 02:55 / eli-b
040 Selenium	0.023	mg/L		0.001		E200.8	10/20/18 02:55 / eli-b
015 Uranium	0.0537	mg/L		0.0003		E200.8	10/20/18 02:55 / eli-b
244 Uranium Precision (±)	0.00866	mg/L		0.00005		E200.8	10/20/18 02:55 / eli-b
113 Uranium, Activity	3.6E-08	uCi/mL		2.0E-10		E200.8	10/20/18 02:55 / eli-b
114 Uranium, Activity precision (±)	5.9E-09	uCi/mL		3.0E-11		E200.8	10/20/18 02:55 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.38	s.u.				FIELD	10/10/18 09:41 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100478-004
Client Sample ID: 9998

Report Date: 10/24/18
Collection Date: 10/10/18 09:45
Date Received: 10/11/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	118	mg/L		1		E300.0	10/13/18 10:34 / ljl
108 Sulfate	637	mg/L	D	2		E300.0	10/13/18 10:34 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1390	mg/L	D	20		A2540 C	10/12/18 12:24 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.123	mg/L		0.001		E200.8	10/20/18 03:00 / eli-b
040 Selenium	0.024	mg/L		0.001		E200.8	10/20/18 03:00 / eli-b
015 Uranium	0.0536	mg/L		0.0003		E200.8	10/20/18 03:00 / eli-b
244 Uranium Precision (±)	0.00865	mg/L		0.00005		E200.8	10/20/18 03:00 / eli-b
113 Uranium, Activity	3.6E-08	uCi/mL		2.0E-10		E200.8	10/20/18 03:00 / eli-b
114 Uranium, Activity precision (±)	5.9E-09	uCi/mL		3.0E-11		E200.8	10/20/18 03:00 / eli-b
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.38	s.u.				FIELD	10/10/18 09:45 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18120219-006
Client Sample ID: X

Report Date: 01/02/19
Collection Date: 12/05/18 11:20
Date Received: 12/07/18
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	235	mg/L		5		A2320 B	12/11/18 15:03 / ljl
206 Carbonate as CO3	<5	mg/L		5		A2320 B	12/11/18 15:03 / ljl
505 Bicarbonate as HCO3	287	mg/L		5		A2320 B	12/11/18 15:03 / ljl
007 Chloride	89	mg/L		1		E300.0	12/11/18 00:01 / ljl
031 Fluoride	0.3	mg/L	D	0.2		E300.0	12/11/18 00:01 / ljl
108 Sulfate	495	mg/L	D	2		E300.0	12/11/18 00:01 / ljl
001 Calcium	146	mg/L		1		E200.7	12/14/18 21:37 / jcg
002 Magnesium	34	mg/L		1		E200.7	12/14/18 21:37 / jcg
003 Potassium	4	mg/L		1		E200.7	12/17/18 02:25 / jcg
004 Sodium	136	mg/L		1		E200.7	12/17/18 02:25 / jcg
NON-METALS							
072 Organic Carbon, Dissolved (DOC)	0.6	mg/L		0.5		A5310 C	12/07/18 18:42 / dmb
INORGANICS							
Sulfide	0.91	mg/L	HU	2		E376.1	12/14/18 00:00 / ta-a
*** Sulfide subbed to Test America.							
NUTRIENTS							
Nitrogen, Ammonia as N	0.03	mg/L	J	0.05		E350.1	12/12/18 15:15 / dmb
310 Nitrogen, Nitrate+Nitrite as N	1.24	mg/L		0.01		E353.2	12/10/18 12:59 / dmb
METALS, DISSOLVED							
022 Aluminum	<0.03	mg/L		0.03		E200.8	12/17/18 00:20 / jcg
024 Barium	0.022	mg/L	J	0.05		E200.8	12/10/18 05:22 / jcg
032 Iron	0.004	mg/L	J	0.02		E200.8	12/13/18 05:50 / jcg
034 Manganese	0.0005	mg/L	J	0.001		E200.8	12/10/18 05:22 / jcg
036 Molybdenum	0.129	mg/L		0.001		E200.8	12/10/18 05:22 / jcg
069 Phosphorus	<0.1	mg/L		0.1		E200.7	12/14/18 21:37 / jcg
040 Selenium	0.018	mg/L		0.001		E200.8	12/10/18 05:22 / jcg
080 Silica	15.5	mg/L		0.2		E200.7	12/17/18 02:25 / jcg
015 Uranium	0.0459	mg/L		0.0003		E200.8	12/10/18 05:22 / jcg
042 Vanadium	0.01	mg/L		0.01		E200.8	12/13/18 05:50 / jcg
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1100	mg/L				A1030 E	12/19/18 01:40 / tlf
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.55	s.u.				FIELD	12/05/18 11:20 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

Table 4.2- 1
Lined Pond Water Quality

Table 4.2-1. Lined Pond Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4	8	10	39
E Coll Pond	6/28/18	21.50	8.63	6109	10	77.7	364	336	83.1	8	1380	2760	4720	1.4
	10/9/18	13.10	9.23	5121			293					2100	3810	
Evap Pond 1	6/28/18	23.50	9.54	4518	1470	14	3560	2070	420	53	15900	27800	45500	<0.1
	10/9/18	13.40	9.49	39260			2780					21400	39200	
Evap Pond 2	6/28/18	23.60	8.91	2084	137	79	1460	966	257	23	6120	11800	21400	3.7
	10/9/18	13.20	9.13	20870			1320					10400	18100	
Evap Pond 3A	6/28/18	26.10	9.25	15220	32900	53	93200	32500	454	1120	88000	18600	208000	0.2
	10/9/18	12.50	9.61	63610			6720					42000	77100	
Evap Pond 3B	6/28/18	25.10	9.43	11190	19000	48	28000	18900	674	366	53500	23500	116000	<0.1
	10/9/18	13.60	9.60	63180			6260					40900	77600	
W Coll Pond	6/28/18	21.20	9.09	5217	30	56.1	328	242	72.9	7	1180	2410	4120	3
	10/9/18	13.30	9.15	4908			280					2000	3630	

f = field measurement
t = analyte, total

Table 4.2-1. Lined Pond Water Quality, cont.

Sample Point Name	Date	Mn(t) (mg/l)	Se (mg/l)	Se (t) (mg/l)	Mo (mg/l)	Mo (t) (mg/l)	Unat (mg/l)	Unat (t) (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		134	40	140	36	136	15	115	45	57	372	48	42
E Coll Pond	6/28/18	0.029	0.33	0.342	10	9.96	4.62	4.92	1.6	-0.5	1.1	1	<0.01
	10/9/18		0.246	0.266	8.71	8.53	3.72	4.42					
Evap Pond 1	6/28/18	0.43	0.8	0.78	65.3	112	72.6	67.9	1.6	0.9	2.5	0.6	<0.06
	10/9/18		0.38	5.98	55.4	101	50.2	60					
Evap Pond 2	6/28/18	0.08	0.827	0.87	43.8	50.4	22.5	22.7	1.9	0.6	2.5	0.6	<0.03
	10/9/18		0.707	0.79	44.7	42.8	19.4	21.3					
Evap Pond 3A	6/28/18	1	1.08	1.2	2820	3010	922	841	18.9	20.9	39.8	1040	0.2
	10/9/18		0.394	0.397	115	183	109	105					
Evap Pond 3B	6/28/18	1.4	0.36	0.5	772	993	580	664	28.7	140	168.7	394	<0.1
	10/9/18		0.27	0.27	122	184	123	122					
W Coll Pond	6/28/18	0.01	0.342	0.352	10.1	9.67	4.49	4.61	0.4	1.3	1.7	0.6	<0.01
	10/9/18		0.262	0.279	7.95	7.93	3.8	4.14					

f = field measurement
t = analyte, total

Table 4.2- 2
Evaporation Pond Monitoring Wells Water Quality

Table 4.2-2. Evaporation Pond Monitoring Wells Water Quality

Sample Point Name	Date	WL (feet)	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		13	12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer								250				
D1	7/11/18	39.66	13.60	7.21	2328	<5	197	140	404	41.6	3.7	322
	9/17/18	41.20	12.90	7.21	2340	<5	189	153	440	40	3	291
	12/5/18	43.50	12.70	7.50	2184	<5	174	130	383	37	3	257
DD	8/16/18	47.83	13.80	7.14	3798			73				
	9/17/18	48.79	19.40	7.22	3805	<5	462	74	334	103	6	363
	10/10/18	48.40	13.60	7.19	3906			69				
	11/29/18	48.10	13.00	7.22	3847			71				
	12/5/18	48.55	12.80	7.41	3914	<5	456	71	329	112	6	364
DD2	8/16/18	45.76	13.70	6.98	2993			67				
	10/10/18	15.61	13.00	7.01	3051			63				
	11/29/18	45.43	12.10	6.98	3072			61				
P	No Sample in 2nd Half of 2018											
S4	7/12/18	39.81	14.60	7.15	2422	<5	206	177	527	53	4.1	266
	9/17/18	39.89	14.50	7.22	2417	<5	209	169	507		4	259
	12/5/18	40.50	14.10	7.31	2401	<5	201	159	489	54	4	250
X	7/11/18	34.47	15.30	7.31	1621	<5	153	114	321	34.1	4.7	168
	9/17/18	32.05	15.90	7.53	1738	<5	168	113	265	36	5	156
	10/10/18	31.97	15.50	7.38	1851			118				
	10/10/18	**Quality Control Sample**						118				
	12/5/18	33.25	15.10	7.55	1599	<5	146	89	287	34	4	136

Concentrations greater than site standards are in bold.

f = field measurement

Table 4.2-2. Evaporation Pond Monitoring Wells Water Quality, cont.

Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	372	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
D1	7/11/18	772	1810	1.4	0.059	1.91	1.4200	0.4	1.6	2.00	0.02	0.002
	9/17/18	746		1.5	0.058	2.31	1.6500					0.003
	12/5/18	723		1.18	0.052	1.31	0.9530					0.0009
DD	8/16/18	2040	3540		0.056	0.011	0.1120					
	9/17/18	2040		12.1	0.069	0.003	0.1180					<0.01
	10/10/18	2090	3600		0.091	0.002	0.0942					
	11/29/18	2050	3540		0.075	0.002	0.1120					
	12/5/18	2090		10.8	0.08	0.013	0.1050					<0.01
DD2	8/16/18	1570	2720		<0.001	0.003	0.2090					
	10/10/18	1530	2700		<0.001	0.002	0.2090					
	11/29/18	1470	2700		0.003	<0.001	0.2120					
P	No Sample in 2nd Half of 2018											
S4	7/12/18	754	1820	1	0.029	0.301	0.1110	0.30	1.60	1.90	0.03	<0.01
	9/17/18	716		1.08	0.031	0.339	0.1230					<0.01
	12/5/18	716		0.99	0.032	0.365	0.1170					<0.01
X	7/11/18	438	1170	1.4	0.014	0.078	0.0404	0.2	1	1.2	0.03	0.01
	9/17/18	566		1.75	0.02	0.129	0.0450					0.01
	10/10/18	635	1380		0.023	0.117	0.0537					
	10/10/18	637	1390		0.024	0.123	0.0536					
	12/5/18	495		1.24	0.018	0.129	0.0459					0.01

Concentrations greater than site standards are in bold.

f = field measurement

Table 4.3-1
Compliant Water Quality

Table 4.3-1. Compliant Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer							250				
Post Treatment Tank											
SP2	7/5/2018	21.60	7.22	2243	<5	194	186	453	61.9	9.2	227
	7/12/2018	20.90	6.80	1781	<5	134	131	181	38.8	6.5	203
	7/19/2018	2.80	6.95	1638	<5	112	119	191	36.4	7.2	196
	7/26/2018	21.5	6.79	2025	<5	141	150	233	44.4	7.4	247
	8/2/2018				<5	142	138	141	38.1	7.3	241
	8/9/2018	20.2	7	1972	<5	132	142	167	40.6	6.8	256
	8/30/2018	21	7.17	1797	<5	119	124	98	35.3	5.8	205
	9/28/2018	19.9	7.44	1931	<5	143	133	131	39.4	6.7	238
	10/23/2018	17.7	7.62	1615			115				
	11/1/2018	18.6	7.68	1091			84				
	11/8/2018	15.5	7.83	1070			83				
	11/15/2018	16	7.98	1014			76				
	11/20/2018	13.1	7.11	1656			139				
	11/29/2018	17.2	7.5	1101	<5	90.2	85	212	30.5	4.7	114
	12/27/2018	13.8	8.19	1061			80				

Concentrations greater than site standards are in bold.

f = field measurement

Table 4.3-1. Compliant Water Quality, cont.

Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	372	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
Post Treatment Tank												
SP2	7/5/2018	608	1640	1.8	0.005	0.00	0.01	0.3	<1.5	<1.8	<0.1	<0.01
	7/12/2018	619	1270	1.9	0.019	0.07	0.02	0.2	1.9	2.10	<0.1	<0.01
	7/19/2018	525	1160	1.8	0.016	0.02	0.01	<0.2	<2.1	<2.3	<0.2	<0.001
	7/26/2018	690	1460	1.9	0.02	0.01	0.01	<0.1	<2.7	<2.8	<0.2	<0.001
	8/2/2018	719	1430	1.8	0.025	0.01	0.02	<0.2	<2	<2.2	<0.2	<0.001
	8/9/2018	712	1440	2	0.025	0.05	0.04	<0.2	<2.1	<2.3	<0.1	<0.001
	8/30/2018	692	1280	1.9	0.025	0.03	0.02	<0.2	<2.4	<2.6	<0.1	<0.001
	9/28/2018	726	1410	1.7	0.023	0.01	0.02	<0.2	<2.2	<2.4	<0.1	<0.003
	10/23/2018	539	1160		0.018	0.01	0.01					
	11/1/2018	273	741		0.003	0.00	0.01					
	11/8/2018	269	269		0.003	0.00	0.01					
	11/15/2018	248	666		0.003	0.002	0.00					
	11/20/2018	466	1180		0.005	0.003	0.01					
	11/29/2018	274	735	0.9	0.003	0.003	0.00	<0.2	3.9	<4.1	<0.1	<0.0005
	12/27/2018	255	706		0.003	0.002	0.01					

Concentrations greater than site standards are in bold

f = field measurement

Table 4.3-2
Treated Water Quality

Table 4.3-2. Treated Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer							250				
RO Product											
RO SP1	7/5/2018	21.4	7.04	2246	<5	193	189	457	62.5	9.4	229
	7/12/2018	20.9	6.66	1771	<5	115	130	179	36	5.7	202
	7/19/2018	20.6	6.81	1631	<5	111	117	184	35.6	6.9	191
	7/26/2018	20.5	6.49	2042	<5	142	150	234	44.2	7.5	246
	8/2/2018				<5	<0.5	10	13	<0.5	<0.5	12.7
	8/9/2018	18.7	6.43	1397	<5	3.7	15	14	1.1	<0.5	18.9
	8/30/2018	20.9	5.6	8915	<5	<0.5	9	10	<0.5	<0.5	15.3
	9/28/2018	19.8	6.01	2463	<5	2	19	11	1.8	<0.5	44.8
	10/23/2018	18.1	6.51	2224			11				
	11/1/2018	18	7.95	4748			4				
	11/8/2018	14.4	5.94	1626			2				
	11/15/2018	17.2	7.25	2542			213				
	11/20/2018	14.4	5.09	6696			2				
	11/29/2018	19.1	8.35	1654	<5	<0.5	2	6	<0.5	<0.5	3.2
	12/27/2018	14.7	5.77	1651			2				
Zeolite Treated Water											
300Z	7/2/2018	20.6	5	2416	<5	169	156	<5	46.1	7	249
	7/10/2018	21.7	5.87	2730	<5	245	197	38	69.5	9.5	299
	7/17/2018	20.72	6.06	2645	<5	222	184	58	67.5	9.1	330
	7/23/2018	9.6	6.4	2678	<5	235	185	82	66.7	9.1	298
	9/13/2018	16.6	6.1	2652	<5	248	186	15	63.1	9.4	287
1200Z Trains 1&2	7/10/2018	23.4	5.41	5112	<5	186	173	21	46.1	12.7	352
	7/12/2018	22.2	5.79	2623	<5	166	159	75	45.7	9.1	327
	7/17/2018	20.8	5.97	2460	<5	169	160	63	45.6	8.9	364
	7/23/2018	10.5	6.18	2423	<5	166	165	78	40.3	9	334
	8/1/2018	20.9	5.86	3448	<5	172	161	66	42.6	8.4	343
	8/6/2018	20.3	5.67	2468	<5	163	161	10	43.2	7.8	345
	8/16/2018	18.2	5.75	2470							
	8/23/2018	18.2	3.54	2420	<5	159	166	<5	40.1	7.3	261
	8/30/2018	16.8	3.86	2417	<5	169		<5	52.2	7.9	289
	9/6/2018	17	5.51	2479	<5	200	169	32	50.1	7.2	289
	9/12/2018	19.2	5.72	2536	<5	199	175	63	51.3	8.2	326
	9/20/2018	20.2	5.86	2492	<5	173	168	61	41	8.3	342
	9/28/2018	18.8	5.84	2675	<5	174	163	76	43.1	8.7	388
	10/4/2018	18	5.72	2474	<5	147	166	69	40.2	9.5	385
	10/12/2018	18.4	5.73	2584	<5	140	162	76	40	7.7	370
	10/17/2018				<5	142	153	62	36.2	6.4	341
1200Z Trains 3&4	8/1/2018	19.5	3.6	2492	<5	154	161	<5	37.4	8.3	315
	8/9/2018	19.2	5.31	2443			161				
	8/16/2018	18.2	5.75	2470			163				
	8/23/2018	17.3	5.74	2442	<5	184	159	65	46.5	7.9	321
	8/30/2008	16.6	5.85	2511	<5	189		75	47	8	321
	9/6/2018	16.3	5.91	2464	<5	180	163	68	43.8	7.7	323
	9/12/2018	18.8	5.75	2488	<5	173	167	63	43.8	8.2	340
	12/27/2018	11.6	5.96	2111			141				

Concentrations greater than site standards are in bold.

f = field measurement

Table 4.3-2. Treated Water Quality, cont.

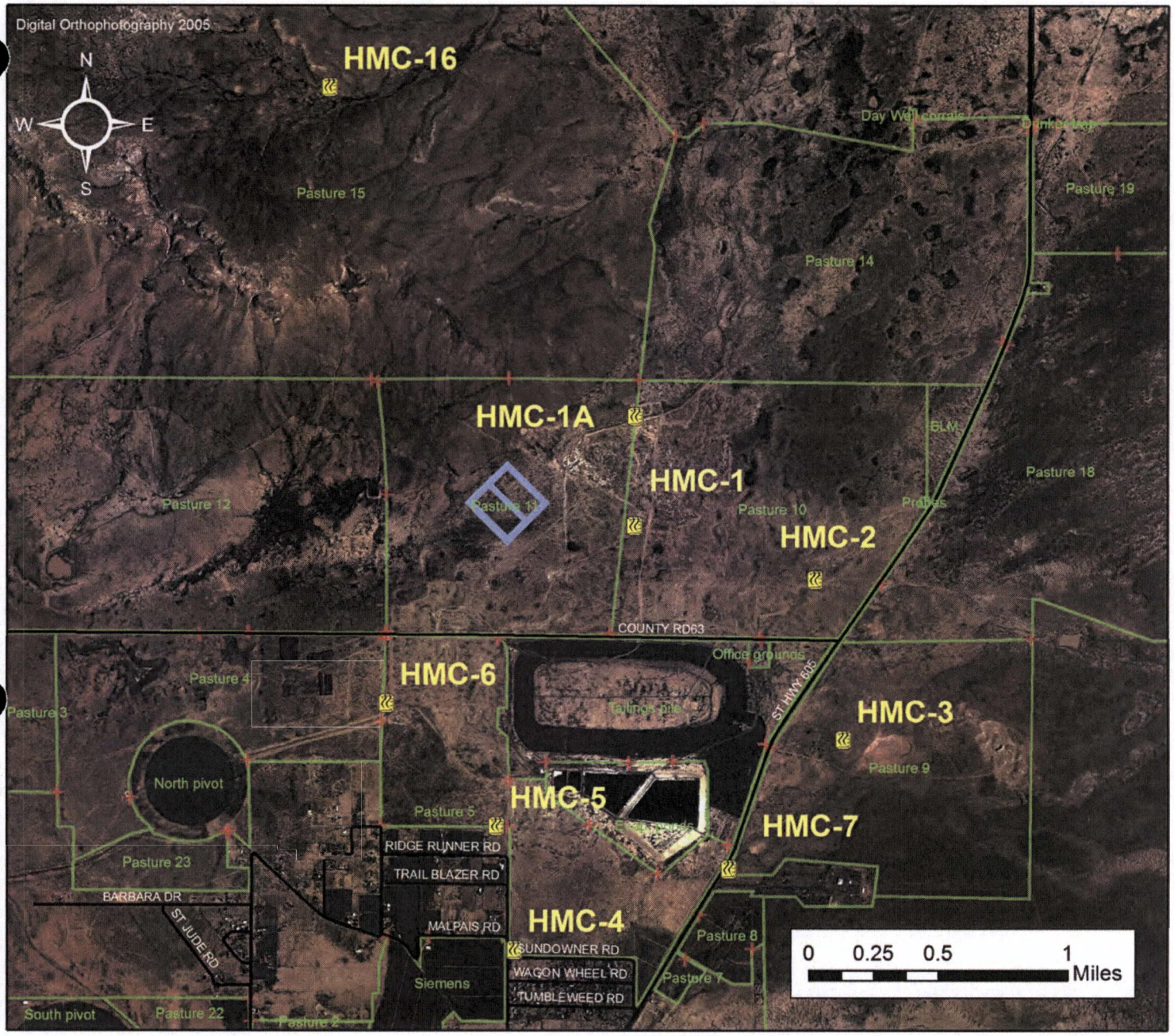
Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	372	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
RO Product												
RO SP1	7/5/2018	608	1640	1.8	0.005	0.003	0.0117	0.4	<1.3	<1.7	<0.05	<0.01
	7/12/2018	617	1260	1.9	0.019	0.07	0.021	0.4	2.2	2.6	<.2	<0.01
	7/19/2018	522	1150	1.7	0.017	0.023	0.0146	<0.3	2.7	<3.0	<0.1	<0.001
	7/26/2018	694	1470	1.9	0.02	0.006	0.0127	<0.1	<2.5	<2.6	<0.1	<0.001
	8/2/2018	2	37	0.8	<0.001	0.004	0.0012	<0.3	<2.5	<2.8	<0.2	<0.001
	8/9/2018	22	73	1.1	0.001	0.012	0.0017	<0.2	<2.4	<2.6	<0.2	<0.001
	8/30/2018	14	47	0.4	0.002	0.054	0.014	<0.2	<2.6	<2.8	<0.07	<0.001
	9/28/2018	65	146	0.8	0.010	0.264	0.0364	<0.2	<2.2	<2.4	<0.1	<0.003
	10/23/2018	51	113		0.004	0.035	0.041					
	11/1/2018	7	30		<0.001	0.011	0.0071					
	11/8/2018	<1	14		<0.001	0.003	0.0007					
	11/15/2018	716	1890		0.011	0.002	0.0136					
	11/20/2018	<1	<10		<0.001	0.005	0.0007					
	11/29/2018	<1	<10	0.3	0.001	0.004	<0.0003	<0.2	<1.1	<1.3	<0.2	<0.0005
	12/27/2018	<1	12		<0.001	0.002	<0.0003					
Zeolite Treated Water												
300Z	7/2/2018	903	1730	1.8	0.024	0.017	0.146	<0.2	<1.9	<2.1	<0.1	<0.01
	7/10/2018	1270	2260	3.6	0.046	0.046	0.0815	<0.2	8.7	<8.9	<0.2	<0.002
	7/17/2018	1170	2200	2.7	0.041	0.042	0.0609	0.2	<1.2	<1.4	<0.1	<0.001
	7/23/2018	1200	2190	3	0.042	0.045	0.0959	<0.2	<2.2	<2.4	<0.1	<0.001
	9/13/2018	1230	2200	3.4	0.045	0.188	0.0111	<0.2	4.9	<5.1	<0.2	0.004
1200Z Trains 1&2	7/10/2018	1180	2080	2.8	0.036	0.012	0.0144	<0.3	3.8	<4.1	<0.1	0.003
	7/12/2018	1040	1910	2.8	0.039	0.008	0.0073	0.2	2.1	<2.2	<0.1	
	7/17/2018	1040	110	2.8	0.038	0.006	0.0049	<0.2	<1.3	<1.5	<0.2	<0.001
	7/23/2018	1040	1870		0.04	0.007	0.0071					
	8/1/2018	1060	1880	2.4	0.043	0.007	0.0211	<0.3	<1.9	<2.2	<0.2	<0.001
	8/6/2018	1060	1890	2.4	0.044	0.005	0.041	<0.2	<2.8	<3	<0.1	<0.001
	8/16/2018											
	8/23/2018	1100	1900	2.9	0.039	<0.001	0.0636	<0.2	<1.4	<1.6	<0.6	0.002
	8/30/2018											
	9/6/2018	1100	1990	2.9	0.044	0.01	0.0012	<0.1	<1.9	<2.0	<0.1	<0.001
	9/12/2018	1160	2020	2.8	0.042	0.026	0.0025	<0.2	<2.6	<2.8	<0.1	<0.001
	9/20/2018	1100	1930	2.5	0.051	0.015	0.0013	<0.3	<2.6	<2.9	<0.1	<0.001
	9/28/2018	1070	2000	2.6	0.046	0.016	0.0014	<0.2	<2.4	<2.6	<0.2	<0.003
	10/4/2018	1070	1910	2.5	0.046	0.011	0.0013	<0.2	<2.6	<2.8	<0.09	<0.001
	10/12/2018	1040	1950	2.5	0.049	<0.013	0.0055	<0.2	<2	<2.2	<0.1	<0.01
	10/17/2018	1010	1920	2.5	0.049	0.013	0.0098	<0.2	<1.6	<1.8	<0.1	<0.0005
1200Z Trains 3&4	8/1/2018	1060	1860	2.8	0.042	<0.001	0.0578	<0.2	0.1	<1.9	<0.2	<0.001
	8/9/2018	1070	1930	2.8	0.045	0.002	0.0122	<0.2	0.1	<2.4	<0.2	<0.001
	8/16/2018	1070	1920	2.7	0.043	0.007	0.0132	<0.2	0.1	<2.1	<0.1	<0.001
	8/23/2018	1030	1870	2.6	0.04	0.007	0.0213	<0.2	0.1	<1.8	<0.1	0.001
	8/30/2008											
	9/6/2018	1050	1900	2.5	0.04	0.01	0.0562	<0.1	0.08	<2.0	<0.1	<0.001
	9/12/2018	1100	1910	2.5	0.042	0.01	0.0913	<0.2	0.1	<3.1	<0.1	<0.001
	12/27/2018	864	1650		0.032	0.012	0.0585					

Concentrations greater than site standards are in bold.

f = field measurement

Figure 1 – Monitoring & Sampling Locations

FIGURE 1 : HMC Air Monitoring & Sampling Locations - Grants, NM



Location ID	Sampling Unit	Northing	Easting
HMC-1	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1547458.8	491370.5
HMC-1A	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1549715.8	491387.7
HMC-2	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1546349.5	495053.2
HMC-3	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543048.7	495640.5
HMC-4	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1538751.1	488918.0
HMC-5	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1541268.4	488546.3
HMC-6	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543813.1	486297.3
HMC-7	Track-Etch Cup (Radon)	1540395.7	493293.8
HMC-16	Track-Etch Cup (Radon), OSL Badge (Gamma)	1556470.5	485135.1

Location
Road
Gate
EP-3
Fence Line
Section Line

HOMESTAKE

Attachment 1
High Volume Air Sampling Results
(Second half of 2018)

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ANALYTICAL SUMMARY REPORT

November 06, 2018

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C18100320 Quote ID: C5150 - Hi-Vol Filters

Project Name: Grants

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 10/4/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C18100320-001	HMC - 1	09/30/18 00:00	10/04/18	Filter	Metals by ICP/ICPMS, Total Client Provided Field Parameters Metals, Total Digestion, Total Metals Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C18100320-002	HMC - 1A	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-003	HMC - 2	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-004	HMC - 3	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-005	HMC - 4	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-006	HMC - 5	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-007	HMC - 6	09/30/18 00:00	10/04/18	Filter	Same As Above
C18100320-008	HMC - 7	09/30/18 00:00	10/04/18	Filter	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Homestake Mining Co
Project: Grants
Work Order: C18100320

Report Date: 11/06/18

CASE NARRATIVE

Tests associated with analyst identified as ELI-H were subcontracted to Energy Laboratories, 3161 E.Lyndale Ave., Helena, MT, EPA Number MT00945.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-001
Client Sample ID: HMC - 1

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 12:38 / eli-h
METALS, IN AIR							
Uranium	4.7E-10	mg/L				SW6020	10/23/18 19:03 / eli-h
Uranium, Activity	3.2E-16	uCi/mL				SW6020	10/23/18 19:03 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.7E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	8.3E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	9.3E-18	uCi/mL				E908.0	10/26/18 09:39 / cnh
Thorium 230 precision (±)	1.8E-18	uCi/mL				E908.0	10/26/18 09:39 / cnh
Thorium 230 MDC	2.5E-18	uCi/mL				E908.0	10/26/18 09:39 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	1.3	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.26	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.36	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	45.4	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	3.5E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.44E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 1

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-001	^{nat}U	3E-16	N/A	N/A	1E-16	9E-14	4E-01
Third Quarter 2018	^{230}Th	9E-18	2E-18	3E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	2E-17	8E-18	1E-17	1E-16	9E-13	2E-03
1.44E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-002
Client Sample ID: HMC - 1A

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 12:40 / eli-h
METALS, IN AIR							
Uranium	2.7E-10	mg/L				SW6020	10/23/18 19:06 / eli-h
Uranium, Activity	1.8E-16	uCi/mL				SW6020	10/23/18 19:06 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	2.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	8.6E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	8.7E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	1.7E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	3.0E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.8	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	1.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.24	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.43	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	26.0	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	2.0E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.42E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 1A

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-002	^{nat}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
Third Quarter 2018	^{230}Th	9E-18	2E-18	3E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	2E-17	9E-18	1E-17	1E-16	9E-13	2E-03
1.42E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-003
Client Sample ID: HMC - 2

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 12:42 / eli-h
METALS, IN AIR							
Uranium	4.5E-10	mg/L				SW6020	10/23/18 19:08 / eli-h
Uranium, Activity	3.1E-16	uCi/mL				SW6020	10/23/18 19:08 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.5E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	8.1E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	1.2E-17	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	2.3E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	3.3E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	1.7	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.33	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.48	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	44.3	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	4.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	3.4E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.44E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 2

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-003	^{nat}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
Third Quarter 2018	^{230}Th	1E-17	2E-18	3E-18	1E-16	3E-14	4E-02
Air Volume in mLs	^{226}Ra	1E-17	8E-18	1E-17	1E-16	9E-13	2E-03
1.44E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-004
Client Sample ID: HMC - 3

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 12:44 / eli-h
METALS, IN AIR							
Uranium	1.3E-09	mg/L				SW6020	10/23/18 19:10 / eli-h
Uranium, Activity	8.8E-16	uCi/mL				SW6020	10/23/18 19:10 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	2.4E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	9.9E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.1E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	1.9E-17	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	3.5E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	2.7E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.4	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	1.4	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	2.6	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.50	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.38	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	123	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	6.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	9.7E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.40E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 3

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-004	^{nat}U	9E-16	N/A	N/A	1E-16	9E-14	1E+00
Third Quarter 2018	^{230}Th	2E-17	4E-18	3E-18	1E-16	3E-14	6E-02
Air Volume in mLs	^{226}Ra	2E-17	1E-17	1E-17	1E-16	9E-13	3E-03
1.40E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-005
Client Sample ID: HMC - 4

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 12:54 / eli-h
METALS, IN AIR							
Uranium	1.0E-09	mg/L				SW6020	10/23/18 19:12 / eli-h
Uranium, Activity	6.8E-16	uCi/mL				SW6020	10/23/18 19:12 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.7E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	7.7E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	9.3E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	1.8E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	2.7E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	1.1	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	1.3	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.25	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.39	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	98.2	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	7.6E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.44E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 4

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-005	^{nat}U	7E-16	N/A	N/A	1E-16	9E-14	8E-01
Third Quarter 2018	^{230}Th	9E-18	2E-18	3E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	2E-17	8E-18	1E-17	1E-16	9E-13	2E-03
1.44E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-006
Client Sample ID: HMC - 5

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 13:01 / eli-h
METALS, IN AIR							
Uranium	2.3E-09	mg/L				SW6020	10/23/18 19:28 / eli-h
Uranium, Activity	1.5E-15	uCi/mL				SW6020	10/23/18 19:28 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	2.9E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	1.6E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	2.1E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	1.4E-17	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	2.7E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	3.8E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.2	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	2.3	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	3.0	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	2.0	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.38	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.54	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	220	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	5.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	1.7E+00	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.44E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 5

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-006	^{nat}U	2E-15	N/A	N/A	1E-16	9E-14	2E+00
Third Quarter 2018	^{230}Th	1E-17	3E-18	4E-18	1E-16	3E-14	5E-02
Air Volume in mLs	^{226}Ra	3E-17	2E-17	2E-17	1E-16	9E-13	3E-03
1.44E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-007
Client Sample ID: HMC - 6

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	10/29/18 13:03 / eli-h
METALS, IN AIR							
Uranium	5.5E-10	mg/L				SW6020	10/23/18 19:30 / eli-h
Uranium, Activity	3.7E-16	uCi/mL				SW6020	10/23/18 19:30 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.3E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	6.1E-18	uCi/mL				E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.0E-17	uCi/mL				E903.0	10/22/18 16:22 / trs
Thorium 230	1.0E-17	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	1.9E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	2.6E-18	uCi/mL				E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	1.8	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	0.87	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230	1.4	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.27	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.37	pCi/Filter				RADCALC	11/05/18 14:52 / sec
Uranium, Activity	53.0	pCi/Filter		0.20		RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	1.0E-03	%				RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	4.1E-01	%				RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.42E+08	L				FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 6

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-007	^{nat}U	4E-16	N/A	N/A	1E-16	9E-14	4E-01
Third Quarter 2018	^{230}Th	1E-17	2E-18	3E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	1E-17	6E-18	1E-17	1E-16	9E-13	1E-03
1.42E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18100320-008
Client Sample ID: HMC - 7

Report Date: 11/06/18
Collection Date: 09/30/18
Date Received: 10/04/18
Matrix: Filter

Analyses	Result	Units	Qual	MCL/ RL QCL	Method	Analysis Date / By
METALS, TOTAL						
Vanadium	<0.10	mg/filter		0.10	SW6020	10/29/18 13:05 / eli-h
METALS, IN AIR						
Uranium	0.00041	mg/L			SW6020	10/23/18 19:31 / eli-h
Uranium, Activity	2.8E-10	uCi/mL			SW6020	10/23/18 19:31 / eli-h
RADIONUCLIDES - IN AIR						
Radium 226	-3.7E-10	uCi/mL	U		E903.0	10/22/18 16:22 / trs
Radium 226 precision (±)	8.9E-10	uCi/mL			E903.0	10/22/18 16:22 / trs
Radium 226 MDC	1.5E-09	uCi/mL			E903.0	10/22/18 16:22 / trs
Thorium 230	8.8E-10	uCi/mL			E908.0	10/26/18 09:38 / cnh
Thorium 230 precision (±)	4.1E-10	uCi/mL			E908.0	10/26/18 09:38 / cnh
Thorium 230 MDC	4.8E-10	uCi/mL			E908.0	10/26/18 09:38 / cnh
RADIONUCLIDES - IN AIR - PER FILTER						
Radium 226	-0.37	pCi/Filter	U		RADCALC	11/05/18 14:52 / sec
Radium 226 precision (±)	0.89	pCi/Filter			RADCALC	11/05/18 14:52 / sec
Radium 226 MDC	1.5	pCi/Filter			RADCALC	11/05/18 14:52 / sec
Thorium 230	0.88	pCi/Filter			RADCALC	11/05/18 14:52 / sec
Thorium 230 precision (±)	0.41	pCi/Filter			RADCALC	11/05/18 14:52 / sec
Thorium 230 MDC	0.48	pCi/Filter			RADCALC	11/05/18 14:52 / sec
Uranium, Activity	0.28	pCi/Filter		0.20	RADCALC	11/05/18 14:52 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE						
Radium 226, % of EFF	-4.0E+04	%			RADCALC	11/05/18 16:07 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL			RADCALC	11/05/18 16:07 / sec
Radium 226, LLD	1.0E-16	uCi/mL			RADCALC	11/05/18 16:07 / sec
Thorium 230, % of EFF	2.9E+06	%			RADCALC	11/05/18 16:07 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL			RADCALC	11/05/18 16:07 / sec
Thorium 230, LLD	1.0E-16	uCi/mL			RADCALC	11/05/18 16:07 / sec
Uranium Natural, % of EFF	3.1E+05	%			RADCALC	11/05/18 16:07 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL			RADCALC	11/05/18 16:07 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL			RADCALC	11/05/18 16:07 / sec
CLIENT PROVIDED FIELD PARAMETERS						
Air Filtering Volume	1	L			FIELD	09/30/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: November 6, 2018

SAMPLE ID: HMC - 7

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C18100320-008	^{nat}U	2E-18	N/A	N/A	1E-16	9E-14	2E-03
Third Quarter 2018	^{230}Th	6E-18	3E-18	3E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	-3E-18	6E-18	1E-17	1E-16	9E-13	-3E-04
1.43E+11							

Air Volumes on this page based on average of quarterly set; accompanying standard report uses a 1 L default volume.

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226

Day for Lead-210

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Homestake Mining Co
Project: Grants

Report Date: 10/31/18
Work Order: C18100320

Analyte		Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**SW6020**								Analytical Run: ICPMS205-H_181023B	
Lab ID:	**ICV**	Initial Calibration Verification Standard							10/23/18 12:42	
Uranium		0.0594	mg/L	0.00030	99	90	110			
Lab ID:	**ICSA**	Interference Check Sample A							10/23/18 12:44	
Uranium		1.69E-05	mg/L	0.00030						
Lab ID:	**ICSAB**	Interference Check Sample AB							10/23/18 12:46	
Uranium		6.32E-06	mg/L	0.00030		0	0			
Lab ID:	**ICV**	Initial Calibration Verification Standard							10/23/18 14:44	
Uranium		0.0576	mg/L	0.00030	96	90	110			
Lab ID:	**ICSA**	Interference Check Sample A							10/23/18 14:46	
Uranium		1.57E-05	mg/L	0.00030						
Lab ID:	**ICSAB**	Interference Check Sample AB							10/23/18 14:47	
Uranium		5.03E-06	mg/L	0.00030		0	0			
Method:	**SW6020**								Batch: 43534	
Lab ID:	**MB-52586**	Method Blank				Run: ICPMS205-H_181023B			10/23/18 19:01	
Uranium		5E-05	mg/L							
Lab ID:	**C18100320-001ADIL**	Serial Dilution				Run: ICPMS205-H_181023B			10/23/18 19:04	
Uranium		4.35E-10	mg/L	1.5E-10		0	0	6.9	20	
Lab ID:	**LCS2-52586**	Laboratory Control Sample				Run: ICPMS205-H_181023B			10/23/18 19:14	
Uranium		0.0920	mg/L	1.5E-10	88	85	115			
Lab ID:	**LFB-52586**	Laboratory Fortified Blank				Run: ICPMS205-H_181023B			10/23/18 19:16	
Uranium		0.0438	mg/L	1.5E-10	88	75	125			
Lab ID:	**C18100320-001APDS1**	Post Digestion/Distillation Spike				Run: ICPMS205-H_181023B			10/23/18 19:18	
Uranium		7.57E-10	mg/L	1.5E-10	84	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 11/02/18
Project: Grants
Work Order: C18100320

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: R240882
Lab ID: LCS-52586		Laboratory Control Sample				Run: G542M-2_181016A				10/22/18 16:22
Radium 226		84.0	pCi/L		88	80	120			
Lab ID: MB-52586	3	Method Blank				Run: G542M-2_181016A				10/22/18 16:22
Radium 226		0.4	pCi/L							U
Radium 226 precision (±)		0.4	pCi/L							
Radium 226 MDC		0.5	pCi/L							
Lab ID: C18100320-004AMS		Sample Matrix Spike				Run: G542M-2_181016A				10/22/18 16:22
Radium 226		1.28E-06	pCi/L		92	70	130			
Lab ID: C18100320-004AMSD		Sample Matrix Spike Duplicate				Run: G542M-2_181016A				10/22/18 16:22
Radium 226		1.11E-06	pCi/L		80	70	130	14	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 11/02/18
Project: Grants
Work Order: C18100320

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E908.0**										Batch: R241250
Lab ID: **LCS-52586**		Laboratory Control Sample				Run: EGG-ORTEC_2_181019A			10/26/18 09:38	
Thorium 230		26.8	pCi/L		107	80	120			
Lab ID: **C18100320-005AMS**		Sample Matrix Spike				Run: EGG-ORTEC_2_181019A			10/26/18 09:38	
Thorium 230		113	pCi/L		112	70	130			
Lab ID: **C18100320-005AMSD**		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_2_181019A			10/26/18 09:38	
Thorium 230		73.4	pCi/L		73	70	130	42	20	R
- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than the limit of 2.0.										
Lab ID: **MB-52586**	3	Method Blank				Run: EGG-ORTEC_2_181019A			10/26/18 09:38	
Thorium 230		0.5	pCi/L							
Thorium 230 precision (±)		0.3	pCi/L							
Thorium 230 MDC		0.4	pCi/L							

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 11/01/18
Project: Grants
Work Order: C18100320

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: SUB-H139446	
Lab ID: ICV		Initial Calibration Verification Standard							10/29/18 10:02	
Vanadium		0.0612	mg/L	0.0010	102	90	110			
Lab ID: ICSA		Interference Check Sample A							10/29/18 10:04	
Vanadium		-7.31E-05	mg/L	0.0010		0	0			
Lab ID: ICSAB		Interference Check Sample AB							10/29/18 10:06	
Vanadium		0.0196	mg/L	0.0010	98	70	130			
Method: SW6020									Batch: H_43535	
Lab ID: MB-52587		Method Blank				Run: SUB-H139446			10/29/18 12:28	
Vanadium		ND	mg/filter	0.001						
Lab ID: LCS2-52587		Laboratory Control Sample				Run: SUB-H139446			10/29/18 12:30	
Vanadium		ND	mg/filter	0.10	0	70	130			S
- Spike solution did not include V.										
Lab ID: LFB-52587		Laboratory Fortified Blank				Run: SUB-H139446			10/29/18 12:34	
Vanadium		0.092	mg/filter	0.10	92	75	125			
Lab ID: C18100320-005B		Serial Dilution				Run: SUB-H139446			10/29/18 12:56	
Vanadium		0.069	mg/filter	0.10		0	0		10	N
Lab ID: C18100320-005B		Sample Matrix Spike				Run: SUB-H139446			10/29/18 12:57	
Vanadium		0.16	mg/filter	0.10	93	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

Work Order Receipt Checklist

Homestake Mining Co

C18100320

Login completed by: Tessa Parke
Date Received: 10/4/2018

Reviewed by: Kasey Vidick
Received by: dmf

Reviewed Date: 10/6/2018
Carrier name: Next Day Air

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Applicable ☑
Container/Temp Blank temperature:	°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

Page _____ of _____

PLEASE PRINT (Provide as much information as possible.)

Company Name: Homestake Mining Company	Project Name, PWS, Permit, Etc.: GRANTS	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address (Required): P.O. Box 98 Grants NM, 87020 ☐ No Hard Copy Email:	Contact Name: Kyle Martinez Phone/Fax: 1-505-287-4456 ext. 29 Cell:		Sampler: (Please Print)
	Invoice Contact & Phone: TRH 1282235884571 4 2745	Purchase Order:	Quote/Bottle Order:

Invoice Address (Required): SAME ☐ No Hard Copy Email:

Special Report/Formats:
☐ DW ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils/Solids Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

Standard Turnaround (TAT)

RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Shipped by:

Cooler ID(s):

Receipt Temp _____ °C

On Ice: Y N

Custody Seal On Bottle Y N On Cooler Y N

Intact Y N

Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Total Uranium	Ra - 226	TH - 230	Vanadium	SEE ATTACHED	Comments: Air Volumes
1	HMC - 1	↑			X	X	X	X		1.44 E+11 mL
2	HMC - 1A	3rd	QTR		X	X	X	X		1.42 E+11 mL
3	HMC - 2	1			X	X	X	X		1.44 E+11 mL
4	HMC - 3	20	18		X	X	X	X		1.40 E+11 mL
5	HMC - 4	1			X	X	X	X		1.44 E+11 mL
6	HMC - 5	COMPOSITE			X	X	X	X		1.44 E+11 mL
7	HMC - 6	|			X	X	X	X		1.42 E+11 mL
8	HMC - 7	|			X	X	X	X		N/A E+11 mL
9		↓								
10										

LABORATORY USE ONLY C810037

Custody Record MUST be Signed

Relinquished by (print): Kyle Martinez	Date/Time: 10-3-18	Signature:	Received by (print):
Relinquished by (print):	Date/Time:	Signature:	Received by (print):
Sample Disposal: Return to Client: _____	Lab Disposal: _____		Received by Laboratory:

Date/Time: 10-4-18 10:45 Signature:

Date/Time: Signature:

Date/Time: Signature:

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links

ENERGY LABORATORIES
Trust our People. Trust our Data.
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Billings, MT 800.735.4489 • Casper, WY 888.235.0515
Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

ANALYTICAL SUMMARY REPORT

February 11, 2019

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C19010089 Quote ID: C5150 - Hi-Vol Filters
Project Name: Grants

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 1/4/2019 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C19010089-001	HMC-1		01/04/19	Filter	Metals by ICP/ICPMS, Total Composite of two or more samples Client Provided Field Parameters Metals, Total Digestion, Total Metals Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C19010089-002	HMC-1A		01/04/19	Filter	Same As Above
C19010089-003	HMC-2		01/04/19	Filter	Same As Above
C19010089-004	HMC-3		01/04/19	Filter	Same As Above
C19010089-005	HMC-4		01/04/19	Filter	Same As Above
C19010089-006	HMC-5		01/04/19	Filter	Same As Above
C19010089-007	HMC-6		01/04/19	Filter	Same As Above
C19010089-008	HMC-7		01/04/19	Filter	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By:

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-001
Client Sample ID: HMC-1

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/07/19 16:57 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:10 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:10 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	1.6E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	6.9E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.8E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	3.4E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	1.6E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.3	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	0.52	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.22	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.24	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	6.9	pCi/Filter		0.20		RADCALC	02/08/19 15:07 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	1.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	5.0E-02	%				RADCALC	02/08/19 15:22 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.51E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-1

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-001	^{nat}U	5E-17	N/A	N/A	1E-16	9E-14	5E-02
Fourth Quarter 2018	^{230}Th	3E-18	1E-18	2E-18	1E-16	3E-14	1E-02
Air Volume in mLs	^{226}Ra	2E-17	7E-18	7E-18	1E-16	9E-13	2E-03
1.51E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-002
Client Sample ID: HMC-1A

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/07/19 17:15 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:29 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:29 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	3.2E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	1.0E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.8E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	4.4E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.9E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	2.6E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.6	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.5	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	0.64	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.28	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.38	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	1.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	4.0E-05	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.46E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-1A

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-002	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 4E-05
Fourth Quarter 2018	^{230}Th	4E-18	2E-18	3E-18	1E-16	3E-14	1E-02
Air Volume in mLs	^{226}Ra	3E-17	1E-17	7E-18	1E-16	9E-13	4E-03
1.46E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-003
Client Sample ID: HMC-2

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/ RL QCL	Method	Analysis Date / By
METALS, TOTAL						
Vanadium	<0.10	mg/filter		0.10	SW6020	02/07/19 17:20 / jcg
METALS, IN AIR						
Uranium	<1.5E-10	mg/L		1.5E-10	SW6020	02/05/19 15:33 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16	SW6020	02/05/19 15:33 / jcg
RADIONUCLIDES - IN AIR						
Radium 226	2.7E-17	uCi/mL			E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	9.4E-18	uCi/mL			E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.7E-18	uCi/mL			E903.0	01/22/19 17:31 / nsr
Thorium 230	6.5E-18	uCi/mL			E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.2E-18	uCi/mL			E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	2.3E-18	uCi/mL			E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER						
Radium 226	4.0	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.4	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	0.99	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Thorium 230	0.97	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.18	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.35	pCi/Filter			RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20	RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE						
Radium 226, % of EFF	3.0E-03	%			RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL			RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL			RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	2.0E-02	%			RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL			RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL			RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	3.0E-05	%			RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL			RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL			RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS						
Air Filtering Volume	1.49E+8	L			FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-2

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-003	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 3E-05
Fourth Quarter 2018	^{230}Th	6E-18	1E-18	2E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	3E-17	9E-18	7E-18	1E-16	9E-13	3E-03
1.49E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-004
Client Sample ID: HMC-3

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/07/19 17:24 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:38 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:38 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	2.2E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	8.1E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.9E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	5.0E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.7E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	1.7E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	0.74	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.25	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.24	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	1.0E-04	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.47E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-3

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-004	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 1E-04
Fourth Quarter 2018	^{230}Th	5E-18	2E-18	2E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	2E-17	8E-18	7E-18	1E-16	9E-13	2E-03
1.47E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-005
Client Sample ID: HMC-4

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/08/19 17:50 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:42 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:42 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	2.7E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	9.2E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.9E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	5.9E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	2.0E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	2.3E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.9	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.3	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	0.86	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.29	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.33	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	5.0E-05	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-4

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-005	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 5E-05
Fourth Quarter 2018	^{230}Th	6E-18	2E-18	2E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	3E-17	9E-18	7E-18	1E-16	9E-13	3E-03
1.45E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-006
Client Sample ID: HMC-5

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/08/19 17:54 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:47 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:47 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	2.6E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	8.6E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	6.7E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	6.9E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.3E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	1.9E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.7	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	0.98	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.19	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.27	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	6.0E-05	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-5

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-006	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 6E-05
Fourth Quarter 2018	^{230}Th	7E-18	1E-18	2E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	3E-17	9E-18	7E-18	1E-16	9E-13	3E-03
1.45E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-007
Client Sample ID: HMC-6

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/08/19 17:59 / jcg
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	02/05/19 15:51 / jcg
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	02/05/19 15:51 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	4.3E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	1.4E-17	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	7.0E-18	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	8.5E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	1.6E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	2.2E-18	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	2.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	1.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.23	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.32	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	<0.20	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	3.0E-05	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.44E+8	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC-6

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-007	^{nat}U	< 1E-18	N/A	N/A	1E-16	9E-14	< 3E-05
Fourth Quarter 2018	^{230}Th	8E-18	2E-18	2E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	4E-17	1E-17	7E-18	1E-16	9E-13	5E-03
1.44E+11							

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226
Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19010089-008
Client Sample ID: HMC-7

Report Date: 02/11/19
Collection Date: Not Provided
Date Received: 01/04/19
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	02/08/19 18:03 / jcg
METALS, IN AIR							
Uranium	0.00052	mg/L	DB	0.000022		SW6020	02/05/19 15:56 / jcg
Uranium, Activity	3.5E-10	uCi/mL	D	1.5E-11		SW6020	02/05/19 15:56 / jcg
RADIONUCLIDES - IN AIR							
Radium 226	3.2E-09	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 precision (±)	1.3E-09	uCi/mL				E903.0	01/22/19 17:31 / nsr
Radium 226 MDC	1.1E-09	uCi/mL				E903.0	01/22/19 17:31 / nsr
Thorium 230	4.2E-10	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 precision (±)	2.1E-10	uCi/mL				E908.0	02/06/19 06:50 / arh
Thorium 230 MDC	2.5E-10	uCi/mL				E908.0	02/06/19 06:50 / arh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.1	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 precision (±)	1.2	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Radium 226 MDC	1.1	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230	0.39	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 precision (±)	0.20	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Thorium 230 MDC	0.24	pCi/Filter				RADCALC	02/08/19 14:43 / sec
Uranium, Activity	0.33	pCi/Filter		0.20		RADCALC	02/08/19 14:43 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.6E+05	%				RADCALC	02/08/19 14:44 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/08/19 14:44 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, % of EFF	1.4E+06	%				RADCALC	02/08/19 14:44 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, % of EFF	3.9E+05	%				RADCALC	02/08/19 14:44 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/08/19 14:44 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/08/19 14:44 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	12/31/18 00:00 / ***

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
B - *The analyte was detected in the method blank.*

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Grants
PROJECT: Grants
REPORT DATE: February 11, 2019

SAMPLE ID: HMC - 7

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C19010089-008	^{nat}U	2E-21	N/A	N/A	1E-16	9E-14	2E-06
Fourth Quarter 2018	^{230}Th	6E-21	3E-21	3E-21	1E-16	3E-14	2E-05
Air Volume in mLs	^{226}Ra	-2E-21	6E-21	1E-20	1E-16	9E-13	-3E-07
1.47E+14							

Air Volumes on this page based on average of quarterly set; accompanying standard report uses a 1 L default volume.

+LLD's are from NRC Reg. Guide 4.14
*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2
Year for Natural Uranium
Year for Thorium-230
Week for Radium-226

Day for Lead-210

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants

Report Date: 02/08/19
Work Order: C19010089

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: 53091
Lab ID: C19010089-003AMS		Sample Matrix Spike				Run: TENNELEC-3_190116B				01/22/19 17:31
Radium 226		1.10E-06	pCi/L		77	70	130			
Lab ID: C19010089-003AMSD		Sample Matrix Spike Duplicate				Run: TENNELEC-3_190116B				01/22/19 17:31
Radium 226		1.23E-06	pCi/L		86	70	130	11	20	
Lab ID: LCS-53091		Laboratory Control Sample				Run: TENNELEC-3_190116B				01/22/19 17:31
Radium 226		102	pCi/L		101	80	120			
Lab ID: MB-53091	3	Method Blank				Run: TENNELEC-3_190116B				01/22/19 17:31
Radium 226		0.6	pCi/L							
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.2	pCi/L							

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 02/08/19
Project: Grants
Work Order: C19010089

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0										Batch: 53091
Lab ID: MB-53091	3	Method Blank				Run: EGG-ORTEC_190128B				02/06/19 06:50
Thorium 230		0.2	pCi/L							U
Thorium 230 precision (±)		0.2	pCi/L							
Thorium 230 MDC		0.3	pCi/L							
Lab ID: LCS-53091		Laboratory Control Sample				Run: EGG-ORTEC_190128B				02/06/19 06:50
Thorium 230		49.7	pCi/L		100	80	120			
Lab ID: C19010089-002AMS		Sample Matrix Spike				Run: EGG-ORTEC_190128B				02/06/19 06:50
Thorium 230		6.88E-07	pCi/L		106	70	130			
Lab ID: C19010089-002AMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_190128B				02/06/19 06:50
Thorium 230		7.50E-07	pCi/L		114	70	130	8.5	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 02/11/19
Project: Grants
Work Order: C19010089

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS4-C_190205B	
Lab ID: QCS	Initial Calibration Verification Standard								02/05/19 13:41	
Uranium		0.0182	mg/L	0.00030	91	90	110			
Lab ID: ICSA	Interference Check Sample A								02/05/19 13:46	
Uranium		8.70E-06	mg/L	0.00030						
Lab ID: ICSAB	Interference Check Sample AB								02/05/19 13:50	
Uranium		4.10E-06	mg/L	0.00030						
Method: SW6020									Batch: 53091	
Lab ID: MB-53091	Method Blank					Run: ICPMS4-C_190205B			02/05/19 14:38	
Uranium		0.0003	mg/L	2E-05						
Lab ID: LCS2-53091	Laboratory Control Sample					Run: ICPMS4-C_190205B			02/05/19 14:42	
Uranium		0.0852	mg/L	2.2E-05	77	85	115			S
Lab ID: C19010070-001ADIL	Serial Dilution					Run: ICPMS4-C_190205B			02/05/19 14:56	
Uranium		5.29E-11	mg/L	1.5E-10		0	0	20		
Lab ID: C19010070-001APDS	Post Digestion/Distillation Spike					Run: ICPMS4-C_190205B			02/05/19 15:01	
Uranium		1.08E-09	mg/L	1.5E-10	93	75	125			
Method: SW6020									Analytical Run: ICPMS4-C_190207A	
Lab ID: QCS	Initial Calibration Verification Standard								02/07/19 15:55	
Vanadium		0.0514	mg/L	0.010	103	90	110			
Lab ID: ICSA	Interference Check Sample A								02/07/19 16:00	
Vanadium		-0.00179	mg/L	0.010						
Lab ID: ICSAB	Interference Check Sample AB								02/07/19 16:04	
Vanadium		0.0176	mg/L	0.010						
Method: SW6020									Batch: 53092	
Lab ID: MB-53092	Method Blank					Run: ICPMS4-C_190207A			02/07/19 16:43	
Vanadium		ND	mg/filter	7E-05						
Lab ID: LFB-53092	Laboratory Fortified Blank					Run: ICPMS4-C_190207A			02/07/19 16:47	
Vanadium		0.050	mg/filter	0.10	99	75	125			
Lab ID: C19010089-001BDIL	Serial Dilution					Run: ICPMS4-C_190207A			02/07/19 17:01	
Vanadium		0.0058	mg/filter	0.10		0	0	10		N
Lab ID: C19010089-001BPDS	Post Digestion/Distillation Spike					Run: ICPMS4-C_190207A			02/07/19 17:06	
Vanadium		0.12	mg/filter	0.10	115	85	115			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants

Report Date: 02/11/19
Work Order: C19010089

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS4-C_190208A	
Lab ID: QCS	Initial Calibration Verification Standard								02/08/19 16:57	
Vanadium		0.0502	mg/L	0.010	100	90	110			
Lab ID: ICSA	Interference Check Sample A								02/08/19 17:02	
Vanadium		-0.00192	mg/L	0.010						
Lab ID: ICSAB	Interference Check Sample AB								02/08/19 17:07	
Vanadium		0.0176	mg/L	0.010						
Method: SW6020									Batch: 53092	
Lab ID: MB-53092	Method Blank					Run: ICPMS4-C_190208A			02/08/19 17:45	
Vanadium		ND	mg/filter	7E-05						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

Homestake Mining Co

C19010089

Login completed by: Mark E. Traider
Date Received: 1/4/2019

Reviewed by: Kasey Vidick
Received by: tlh

Reviewed Date: 1/4/2019
Carrier name: NDA

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☑	Not Applicable ☐
Container/Temp Blank temperature:	17.9°C No Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Not Applicable ☑

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None

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Chain of Custody & Analytical Request Record

www.energylab.com

Page 1 of 1

Account Information *(Billing information)*

Company/Name	Homestake Mining Company
Contact	Kyle Martinez
Phone	1-505-287-1606
Mailing Address	P.O. Box 98
City, State, Zip	Grants, NM, 87020
Email	Kmartinez1@homestk.com
Receive Invoice ☐Hard Copy ☐Email	Receive Report ☐Hard Copy ☐Email
Purchase Order / Quote / Bottle Order	

Report Information *(If different than Account Information)*

Company/Name	
Contact	
Phone	SAME
Mailing Address	
City, State, Zip	
Email	
Receive Report ☐Hard Copy ☐Email	

Special Report/Formats: ☐ LEVEL IV ☐ NELAC ☐ EDD/EDT *(contact laboratory)* ☐ Other_____

Comments

TR# 128223584
56895434

See Air Volumes Below.

Project Information

Project Name, PWSID, Permit, etc.	GRANTS
Sampler Name: Kyle Martinez	Sampler Phone: 1-505-287-1606
Sample Origin State: NM	EPA/State Compliance ☐ Yes ☐ No

URANIUM MINING CLIENTS MUST indicate sample type.
☐ NOT Source or Byproduct Material
☐ Source/Processed Ore (Ground or Refined) **CALL BEFORE SENDING
☐ 11e.(2) Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes

A - Air
W - Water
S - Soils/Solids
V - Vegetation
B - Bioassay
O - Other
DW - Drinking Water

All turnaround times are standard unless marked as RUSH.
Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling – See Instructions Page

	Sample Identification (Name, Location, Interval, etc.)	Collection Date	Collection Time	Number of Containers	Matrix (See Codes Above)	Total Uranium	Total RA226	Total TH 230	Total Vanadium	See Attached	RUSH TAT	ELI-LAB ID (Laboratory Use Only)
1	HMC-1	↑				X	X	X	X			1.51E+11
2	HMC-1A	4th	QTR			X	X	X	X			1.46E+11
3	HMC-2	1				X	X	X	X			1.49E+11
4	HMC-3	2018				X	X	X	X			1.47E+11
5	HMC-4	1				X	X	X	X			1.45E+11
6	HMC-5	COMPOSITE				X	X	X	X			1.45E+11
7	HMC-6	↓				X	X	X	X			1.44E+11
8	HMC-7					X	X	X	X			N/A
9		✓										
10												C19010089

Custody Record MUST be signed	Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
	Kyle Martinez	1-3-19 / 1200		Terraes	1/4/19 10:15	
	Relinquished by (print)	Date/Time	Signature	Received by Laboratory (print)	Date/Time	Signature

LABORATORY USE ONLY

Shipped By	Cooler ID(s)	Custody Seals Y N C B	Intact Y N	Receipt Temp °C	Temp Blank Y N	On Ice Y N	Payment Type CC Cash Check_____	Amount $	Receipt Number *(cash/check only)*

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All subcontracted data will be clearly notated on your analytical report.

Attachment 2

Radon Gas Monitoring Results

Attachment 2 - Radon Gas Monitoring Results

Track-Etch Passive Survey

Location	Monitoring Period	Rn Concentration (µCi/ml)	Uncertainty - 2 S.D. (µCi/ml)	LLD (µCi/ml)
HMC #1(average) N Outer Perimeter	7/6/18 - 01/07/19	9.8E-10	1.6E-10	3.2E-10
HMC #1-A (average) N Outer Perimeter	7/6/18 - 01/07/19	8.6E-10	1.5E-10	3.2E-10
HMC #2 (average) NE Outer Perimeter	7/6/18 - 01/07/19	1.1E-09	1.9E-10	3.2E-10
HMC #3 (average) E Outer Perimeter	7/6/18 - 01/07/19	8.0E-10	1.3E-10	3.2E-10
HMC #4 (average) S Outer Perimeter	7/6/18 - 01/07/19	9.7E-10	1.5E-10	3.2E-10
HMC #5 (average) N of Nearest Residence	7/6/18 - 01/07/19	1.0E-09	1.6E-10	3.2E-10
HMC #6 (average) W of Outer Perimeter	7/6/18 - 01/07/19	8.7E-10	1.6E-10	3.2E-10
HMC #7 (average) S Boundary	7/6/18 - 01/07/19	9.9E-10	1.6E-10	3.2E-10
HMC #16 (average) Background	7/6/18 - 01/07/19	4.6E-10	1.2E-10	3.2E-10

Attachment 3
Environmental Gamma Radiation Results

Attachment 3 - Environmental Gamma Radiation Results
OSL Perimeter Survey

Direct Radiation Measurements

Location	Monitoring Period	Dose Rate (mrem/6 mo)	Error (mrem/6 mo)*
HMC #1 N Outer Perimeter	7/1/18 - 12/31/18	58.0	5.7
HMC #1-A N Outer Perimeter	7/1/18 - 12/31/18	59.9	5.9
HMC #2 NE Outer Perimeter	7/1/18 - 12/31/18	63.5	6.2
HMC #3 E Outer Perimeter	7/1/18 - 12/31/18	65.6	6.4
HMC #4 S Outer Perimeter	7/1/18 - 12/31/18	68.8	6.7
HMC #5 N of Nearest Residence	7/1/18 - 12/31/18	65.1	6.4
HMC #6 Background	7/1/18 - 12/31/18	62.3	6.1
HMC #16	7/1/18 - 12/31/18	57.3	5.6

*Error is 1.96 std. dev.

Attachment 4
Public Dose Evaluation

Annual Effective Dose Equivalent to Individuals of the Public

1.0 Introduction

There were very few activities in 2018 at the Grants Uranium Mill Site other than those associated with the groundwater restoration program. All off-pile tailings were consolidated with the tailings in 1995 and covered with a soil cover. All tailings currently have either an interim or permanent cover. Other activities that occurred on the tailings piles include well abandonment and maintenance of the Zeolite water treatment facilities on the Large Tailings Pile (LTP).

The 10 CFR 20.1301 radiation dose limit for individual members of the public from NRC-licensed facilities is specified as a total effective dose equivalent (TEDE) of 100 mrem/year. In addition, 10 CFR 20.1101 has a constraint on air emissions (excluding Rn-222 and its decay products) from a site limiting the TEDE to the maximum exposed member of the public from such emissions to 10 mrem/year. A licensee may request permission from the NRC to operate a facility up to a maximum of 500 mrem/year. Compliance may be demonstrated by calculations or measurements showing that the individual likely to receive the maximum dose from the facility does not exceed the limit, or by comparing measured effluent concentrations to those specified in Table 2 of Appendix B to 10 CFR Part 20. In addition, radiation from external sources for individuals in the unrestricted area may not deliver a dose equivalent of 0.002 rem in any hour or 0.050 rem in one year.

HMC has submitted 2018 environmental monitoring reports as required by 10 CFR 40.65 and License No. SUA-1471. The data from these reports have been used in this dose assessment.

2.0 Dose Assessment

The important pathways for assessing the dose to the maximum exposed individual are: inhalation of airborne particulate from the site, exposure to radon generated at the site, and the exposure to direct gamma radiation originating from the site. The nearest residence is located within 100 yards of the HMC-4 and HMC-5 monitoring stations and therefore the exposure may be conservatively assumed to be comparable to that at the monitoring stations. The exposure at both monitoring stations is considered and the station with the highest exposure is used for calculating the TEDE to the maximum exposed individual. It is known that the nearby residents lead typical lifestyles.

NUREG/CR-5512 recommends default values for the residential scenario. The values for indoor and outdoor occupancy are 200 and 71 effective days/year, respectively. This is equivalent to a 75 percent total occupancy factor. This has been used in this analysis for all pathways.

2.1 Inhalation of Radionuclides

The committed effective dose equivalent (CEDE) from inhalation of particulate was calculated for the five principal long-lived radionuclides, U-238, U-235, U-234, Th-230, and Ra-226, using the quarterly environmental monitoring data given in the Semi-Annual Environmental Reports for 2018.

The monitoring stations HMC-4 and HMC-5 were considered as nearest residence locations and the point of compliance for public dose limits. These stations are located on the southwestern perimeter of the site near existing residences. The use of these data to predict the dose to the nearest resident is conservative in that the doses at the residences should be less than that at the site perimeter.

The CEDE per Unit Intake via Inhalation factors were taken from ICRP 30 tables. The values are given below:

Nuclide	CEDE (mrem/μCi)
U-234	13.2E4
U-235	12.3E4
U-238	11.8E4
Th-230	32.6E4
Ra-226	8.6E3

Isotopic uranium concentrations were assumed present in natural activity abundances of 48.9% each for U-238 and U-234, and 2.2% for U-235 for calculation of the dose per net annual unit intake of each radionuclide, and the net doses were summed to determine the total CEDE from inhalation of the net (above background)[1] concentrations of airborne particulate radionuclides in 2017 at each air monitoring station. Continuous occupancy at a breathing rate of 20,000 liters/day (Table A-1, NUREG-0859) was assumed for the calculation. The total above-background CEDE at locations HMC-4 and HMC-5 for 100 percent occupancy was calculated to be 0.3 mrem/year and 0.8 mrem/y. The results from these calculations are shown in Tables A4-1 and A4-2. The net dose equivalent, when accounting for the occupancy factor of 75%, results in a dose rate of 0.2 and 0.6 mrem/year at HMC-4 and HMC-5 respectively. The location with the highest exposure from all pathways is used for calculating the TEDE to the public (Table A4-3).

2.2 Exposure to Radon

The outdoor radon levels in the Grants Uranium Belt are known to be high and variable, depending on the location relative to mine vents, surface ore deposits, and topographical features. The natural background radon concentrations, arising from the calm winds during the evenings and at times from temperature inversions, generally follow the drainage path of the air. The HMC site is situated at the lowest point in the drainage path for radon generated over a very large area to the North, Northwest, and Lobo Canyon to the East. Therefore, the natural background levels at the site are expected to be high and variable over short periods of time due to being in this drainage path.

The radon data for the four quarterly monitoring periods are provided in Attachment 2 of the semi-annual monitoring reports. Monitoring Station 16 has been accepted as the radon background location for the site. The average radon concentration for 2018 at HMC-4 and HMC-5 was 0.89 and 0.84 pCi/L respectively. The average annual concentration at the background location (HMC-16) was 0.34 pCi/L. Subtracting the background concentration from the measured concentrations at HMC-4 and HMC-5 results in net radon concentrations of 0.54 and 0.50 pCi/L respectively.

Since the nearest residence is within a few hundred feet of the site perimeter and within 3500 feet of the major source of on-site releases of radon, the radon progeny equilibrium is expected to be low due to a small flight time until it reaches the residence. We have selected 20 percent radon progeny equilibrium as an estimate for use in the dose calculations. NRC uses a continuous exposure to 0.1 pCi/L Rn-222, in full equilibrium with the decay products, as being equivalent to a committed effective dose equivalent (CEDE) of 50 mrem/y (10 CFR Part 20, Appendix B). With 20 percent equilibrium, the CEDE would be 100 mrem/pCi/L. Considering the 75 percent occupancy factor, the net radon concentration at the nearest residence locations HMC-4 and

[1] The average background concentration (considered to be air station HMC-6) was subtracted from the annual average concentration for each radionuclide at other stations to obtain the average net concentration of each radionuclide at each air monitoring station for use in determining the net dose estimates.

HMC-5 results in a calculated CEDE of 41 and 37 mrem/y respectively for 2018. The method to calculate public dose from radon-222 is the same used in previous years.

2.3 Dose from Exposure to Direct Radiation

An estimate of the dose equivalent from direct exposure to radiation sources at the site is obtained from optically stimulated luminescence (OSL) dosimeters placed at each monitoring station. The direct radiation measurements for the two monitoring periods are provided in Attachment 4 and Attachment 3 of the first-half and second-half semi-annual monitoring reports, respectively. The average annual effective dose equivalents measured at HMC-4 and HMC-5 locations was 130 and 131 mrem/year, respectively. The average annual effective dose equivalent at the background location (HMC-6) was 115 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5, assuming 100 percent occupancy, was 15 and 16 mrem/year, respectively. Considering the 75 percent occupancy factor, the net annual effective dose equivalent was 11 and 12 mrem/year for HMC-4 and HMC-5, respectively.

2.4 Total Effective Dose Equivalent to the Nearest Resident

The TEDE to the Nearest Resident was calculated by adding the CEDE from inhalation of airborne particulate, the CEDE from the exposure to radon coming from the site, and the dose equivalent from direct gamma radiation (Table A4-3). The TEDE at HMC-4 was 52 mrem/year and at HMC-5 was 50 mrem/year. This is within the 100 mrem/year limit and the particulate TEDE is much below the 10 mrem/y constraint limit on particulate emissions.

Table A4-1: Measured average airborne radionuclide concentrations

Sample ID	Radionuclide	Q1 Conc. (µCi/mL)	Q2 Conc. (µCi/mL)	Q3 Conc. (µCi/mL)	Q4 Conc. (µCi/mL)	Total Annual Average Conc. (µCi/mL)
HMC-1	U-nat	5.0E-17	1.0E-16	3.0E-16	5.0E-17	1.3E-16
	Th-230	5.0E-18	1.0E-17	9.0E-18	3.0E-18	6.8E-18
	Ra-226	3.0E-17	5.0E-17	2.0E-17	2.0E-17	3.0E-17
HMC-1-A	U-nat	4.0E-17	1.0E-16	2.0E-16	1.0E-18	8.5E-17
	Th-230	1.0E-17	2.0E-17	9.0E-18	4.0E-18	1.1E-17
	Ra-226	3.0E-17	5.0E-17	2.0E-17	3.0E-17	3.3E-17
HMC-2	U-nat	5.0E-17	2.0E-16	3.0E-16	1.0E-18	1.4E-16
	Th-230	8.0E-18	2.0E-17	1.0E-17	6.0E-18	1.1E-17
	Ra-226	3.0E-17	8.0E-17	1.0E-17	3.0E-17	3.8E-17
HMC-3	U-nat	9.0E-17	6.0E-16	9.0E-16	1.0E-18	4.0E-16
	Th-230	1.0E-17	2.0E-17	2.0E-17	5.0E-18	1.4E-17
	Ra-226	3.0E-17	7.0E-17	2.0E-17	2.0E-17	3.5E-17
HMC-4	U-nat	1.0E-16	1.0E-15	7.0E-16	1.0E-18	4.5E-16
	Th-230	2.0E-17	5.0E-17	9.0E-18	6.0E-18	2.1E-17
	Ra-226	4.0E-17	2.0E-16	2.0E-17	3.0E-17	7.3E-17
HMC-5	U-nat	1.0E-16	2.0E-15	2.0E-15	1.0E-18	1.0E-15
	Th-230	2.0E-17	2.0E-17	1.0E-17	7.0E-18	1.4E-17
	Ra-226	5.0E-17	6.0E-17	3.0E-17	3.0E-17	4.3E-17
HMC-6	U-nat	5.0E-17	3.0E-16	4.0E-16	1.0E-18	1.9E-16
	Th-230	2.0E-17	2.0E-17	1.0E-17	8.0E-18	1.5E-17
	Ra-226	5.0E-17	7.0E-17	1.0E-17	4.0E-17	4.3E-17
HMC-7 Blank	U-nat	2.0E-18	2.0E-18	2.0E-18	2.0E-21	1.5E-18
	Th-230	2.0E-18	2.0E-18	6.0E-18	6.0E-21	2.5E-18
	Ra-226	2.0E-17	2.0E-17	-3.0E-18	-2.0E-21	9.2E-18

Table A4-2: Calculation of net internal dose (CEDE) due to radionuclides in air particulates from Site operations.

Sample ID	Radionuclide (Isotopic)	Calculated Istotopic Conc. (µCi/mL)*	Net Annual Average Conc. (µCi/mL)**	Inhalation DCF from ICRP 30 (mrem/µCi)	Calculated net CEDE (mrem/yr)	Total net CEDE by Station @100% Occupancy (mrem/yr)	Total net CEDE by Station @75% Occupancy (mrem/yr)
HMC-1	U-234	6.1E-17	0.0E+00	1.32E+05	0.0E+00	9.5E-03	7.1E-03
	U-235	2.8E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	6.1E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.9E-17	4.0E-18	3.26E+05	9.5E-03		
	Ra-226	3.8E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-1-A	U-234	4.8E-17	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	2.1E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	4.8E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.1E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.3E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-2	U-234	6.7E-17	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	3.0E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	6.7E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.1E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.8E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-3	U-234	1.9E-16	1.0E-16	1.32E+05	9.9E-02	1.9E-01	1.4E-01
	U-235	8.8E-18	4.6E-18	1.23E+05	4.1E-03		
	U-238	1.9E-16	1.0E-16	1.18E+05	8.8E-02		
	Th-230	1.4E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.5E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-4	U-234	2.2E-16	1.3E-16	1.32E+05	1.2E-01	2.6E-01	2.0E-01
	U-235	9.9E-18	5.8E-18	1.23E+05	5.2E-03		
	U-238	2.2E-16	1.3E-16	1.18E+05	1.1E-01		
	Th-230	2.4E-17	9.3E-18	3.26E+05	2.2E-02		
	Ra-226	8.8E-17	4.5E-17	8.60E+03	2.8E-03		
HMC-5	U-234	4.9E-16	4.0E-16	1.32E+05	3.9E-01	7.5E-01	5.6E-01
	U-235	2.2E-17	1.8E-17	1.23E+05	1.6E-02		
	U-238	4.9E-16	4.0E-16	1.18E+05	3.4E-01		
	Th-230	1.4E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	4.3E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-6 (Bkg. Station)	U-234	9.2E-17	N/A	N/A	N/A	N/A	N/A
	U-235	4.1E-18					
	U-238	9.2E-17					
	Th-230	1.5E-17					
	Ra-226	4.3E-17					
HMC-7	U-234	7.3E-19	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	3.3E-20	0.0E+00	1.23E+05	0.0E+00		
	U-238	7.3E-19	0.0E+00	1.18E+05	0.0E+00		
	Th-230	2.5E-18	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	9.2E-18	0.0E+00	8.60E+03	0.0E+00		

*Measured U-nat converted to isotopic concentrations assuming natural abundances of 2.2% for U-235, and 48.9% for U-234 and U-238

**Isotopic average values for Station HMC-6 subtracted from measured result at other stations to obtain the net concentration.

Table A4-3: Estimated dose by pathway and calculated TEDE (mrem/yr)

Sample ID	Internal CEDE Air Particulates (mrem/yr)	Internal CEDE Radon (mrem/yr)	Exernal EDE (mrem/yr)	TEDE (mrem/yr)
HMC-4	0.2	41	11	52
HMC-5	0.6	37	12	50